ARMY TM 11-5815-206-12
AIR FORCE TO 31W4-2PGC1-61

OPERATOR'S AND ORGANIZATIONAL
MAINTENANCE MANUAL
FOR

TELETYPEWRITER SETS AN/PGC-1 AND AN/PGC-3

AND

TELETYPEWRITERS TT-4A/TG, TT-4B/TG, TT-4C/TG, TT-335/TG, TT-537/G, TT-698/TG, TT-698A/TG, AND TT-698B/TG

DEPARTMENTS OF THE ARMY, AND THE AIR FORCE

MAY 1976

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

Be careful when working on the 105- to 125-volt motor and signal circuits. Serious injury or death may result from contact with these circuits. Turn off the power and discharge all high-voltage capacitors before making any connection or replacing any parts inside the equipment.

DON'T TAKE CHANCES!

TM 11-5815-206-12
TO 31W4-2PGC1-61
C1

CHANGE NO. 1

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON, DC, 18 FEBRUARY 1977

Operator's and Organizational Maintenance Manual For TELETYPEWRITER SETS AN/PGC-1 AND AN/PGC-3 AND TELETYPEWRITERS TT-4A/TG, TT-4B/TG, TT-4C/TG, TT-335/TG, TT-537/G, TT-698/TG, TT-698A/TG, TT-698B/TG, TT-722/TG AND TT/722A/TG

TM 11-5815-206-12/TO 31W4-2PGC1-61, 28 May 1976, is changed as follows:

1. Title is changed as shown above.
2. Remove old pages and insert new pages as indicated below.
3. New or added material is indicated by a vertical bar in the margin of the page.
4. Added or revised illustrations are indicated by a vertical bar adjacent to the illustration identification number.

Remove pages	*Insert pages*
i and ii	i and ii
1-1 through 1-4	1-1 through 1-4
1-7 through 1-10	1-7 through 1-10
2-11 and 2-12	2-11 and 2-12
None	3-2.1
3-7	3-7/(3-8 blank)
4-5 and 4-6	4-5 and 4-6
A-1	A-1/(A-2 blank)
C-3 through C-5	C-3 through C-5

5. File this change sheet in front of the publication for reference purposes.

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ARNG: State AG (3); Units- Same as Active Army except allowance is one (1) copy each.
USAR: None.
For explanation of abbreviations used, see AR 310-50.

TECHNICAL MANUAL
No. 11-5815-206-12
TECHNICAL ORDER
No. 31W4-2PGC1-61

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON, D.C., *28 May 1976*

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL

FOR

TELETYPEWRITER SETS AN/PGC-1 AND AN/PGC-3 AND TELETYPEWRITERS TT-4A/TG, TT-4B/TG, TT-4C/TG, TT-335/TG, TT-537/G TT-698/TG, TT-698A/TG, TT-698B/TG, TT-722/TG AND TT-722A/TG

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*This manual supersedes TM 11-5815-206-12, 8 April 1959, including all changes.

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual describes Teletypewriter Sets AN/PGC-1 (fig. 1-1) and AN/PGC-3, Teletypewriters TT-4A/TG, TT-4B/TG, TT-4C/TG, TT-537/G, TT-698/TG, TT-698A/TG, TT-698B/TG, TT-722/TG and TT-722A/TG.

It contains instructions for installation, operation and organizational maintenance. The maintenance portion covers the cleaning and inspection of equipment, periodic maintenance service, and the replacement of parts available to organizational personnel.

b. Official nomenclature followed by (*) is used to indicate all models of the equipment item covered in this manual. Thus, Teletypewriter TT-4(*)/TG represents Teletypewriters TT-4A/TG, TT-4B/TG, and TT-4C/TG. Case CY-694(*)/PGC-1 represents CY-694/PGC-1, and CY-694A/PGC-1. Similarily, Teletypewriter TT-698(*)/TG represents Teletypewriter TT-698/TG, TT-698A/TG, and TT-698B/TG. Teletypewriter TT-722(*)/TG represents Teletypewriter TT-722/TG and TT-722A/TG.

c. Teletypewriters modified for low level signaling operation have nomenclature changes as follows:

High-level signaling		*Low-level signaling*
TT-4A/FG	becomes the	TT-698/TG
TT-4B-FG	becomes the	TT-698A/TG
TT-4C-FG	becomes the	TT-698B/TG

(1) High-level teletypewriters operate with line currents of 20 or 60 milliamperes.

(2) Low-level teletypewriters operate with line currents of 100 microamperes or less.

d. The maintenance allocation chart appears in appendix C and is current as of 3 September 1976.

1-2. Indexes of Publications

a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

1.3. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750 (Army). Air Force personnel will use AFM 66-1 for maintenance reporting and TO-00-35D54 for unsatisfactory equipment reporting. Navy personnel will report maintenance performed utilizing the Maintenance Data Collection Subsystem (MDCS) in accordance with OPNAVINST 4790.2, Vol 3 and unsatisfactory material/conditions (UR submissions) in accordance with OPNAVINST 4790.2, Vol 2, chapter 17.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Packaging Improvement Report) as prescribed in AR 700-58/NAVSUPINST 4030.29/AFR 71-13/MCO P4030.29A, and DSAR 4145.8.

c. Discrepancy in Shipment Report (DISREP) SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33A/AFR 75-18/MCO P4610.19B, and DSAR 4500.15.

1-4. Recommendation for Maintenance Publications Improvements

You can improve this manual by recommending improvements using DA Form 2028 (Recommended Changes to Publications and Blank Forms) or DA Form 2028-2 (Test) located in the back of the manual. To use the form in the back of the manual, simply tear it out, fill it out as shown on the sample in figure 1-2, fold it where shown, and drop it in the mail. A reply will be furnished direct to you.

Figure 1-2. DA Form 2028-2 (TEST)—sample.
(Located in back of manual.)

1-4.1. Reporting Equipment Improvement Recommendations (EIR)

a. Army: Reporting Equipment Improvement Recommendations (EIR). EIR's will be prepared us-

ing DA Form 2407, Maintenance Request. Instructions for preparing EIR's are provided in TM 38-750, the Army Maintenance Management System. EIR's should be mailed directly to Command, US Army Electronics Command, ATTN: DRSEL-MA-Q, Fort Monmouth, NJ 07703. A reply will be furnished directly to you.

b. Air Force: Reporting Equipment Improvement Recommendations (EIR). Air Force personnel are encouraged to submit EIR's in accordance with AFM 900-4.

1-5. Administrative Storage

For procedures, forms, and records, and inspections required during administrative storage of this equipment, refer to TM 740-90-1. Refer to chapter 6 for storage preparation instructions that pertain to these teletypewriters.

1-6. Destruction of Army Materiel

Demolition and destruction of electronic equipment will be under the direction of the commander and in accordance with TM 750-244-2, Procedures for Destruction of Equipment to Prevent Enemy Use.

Section II. DESCRIPTION AND DATA

1-7. Purpose and Use

a. Purpose. Teletypewriter Sets AN/PGC-1 and AN/PGC-3, Teletypewriters TT-4(*)/TG, TT-335/TG, TT-698(*)/TG, and TT-722(*)/TG are used to transmit teletypewriter messages in the form of direct-current (dc) teletypewriter signals and to convert received dc signals into messages printed on a roll of recording paper. Teletypewriter TT-537/G is used primarily to receive low-voltage Baudot teletypewriter signals from a field artillery gun direction computer (FADAC) and to record the received messages on 8½-inch-wide recording paper.

b. Use (fig. 3). The AN/PGC-1, AN/PGC-3, TT-4(*), TT-335/TG, TT-698(*)/TG, and TT-722(*)/TG are used in tactical military communication systems. Teletypewriters TT-698(*)/TG are Teletypewriters TT-4B(*)/TG converted to low level signaling operation. Except for the TT-698(*)/TG's ability to detect and process a much lower level signal, all other existing operational features of the basic teletypewriter TT-4(*)/TG are unchanged. Teletypewriters TT-722(*)/TG are Teletypewriters TT-4B/TG and TT-4C/TG modified to include automatic carriage-return and line-feed mechanisms, and special mounting plates to permit use of the teletypewriters in mobile assemblages. Typical applications are:

(1) *Dc system.* In a typical dc system, the sending teletypewriter transmits dc signals to the receiving teletypewriter over a dc circuit that interconnects the two teletypewriters.

(2) *Voice-frequency system.* In a typical voice-frequency system, the sending teletypewriter transmits dc signals to a telegraph terminal which converts the dc signals to voice-frequency signals. The voice-frequency signals are transmitted to a distant telegraph terminal either through telephone switching equipment or over a direct circuit interconnecting the two telegraph terminals. The distant telegraph terminal converts the voice-frequency signals to dc signals and transmits the dc signals to the receiving teletypewriter.

(3) *Carrier system.* In a typical carrier system, the sending teletypewriter transmits dc signals to a telegraph terminal which converts the dc signals to voice-frequency signals and transmits them to a carrier terminal. The carrier terminal converts the voice-frequency signals to carrier signals and transmits the carrier signals to a distant carrier terminal. The distant carrier terminal converts the received carrier signals to voice-frequency signals and transmits them to a telegraph terminal where the voice-frequency signals are converted to dc signals and transmitted to the receiving teletypewriter.

(4) *Radio-teletypewriter system.* In a typical radio-teletypewriter system, signal transmission is the same as in a carrier system ((3) above), except that transmission between carrier terminals is accomplished over a two-way radio circuit instead of a carrier circuit.

(5) *FADAC system.* In a typical FADAC system, low-voltage signals from the computer are applied to the receive circuits of Teletypewriter TT-537/G, where they are amplified to the level required to operate the selector magnet in the teletypewriter receive mechanism. The keyboard transmission capability is not used in this application.

(6) *Low level signaling system.* In a typical low level signaling system line signal current is reduced to 100 microamperes or less.

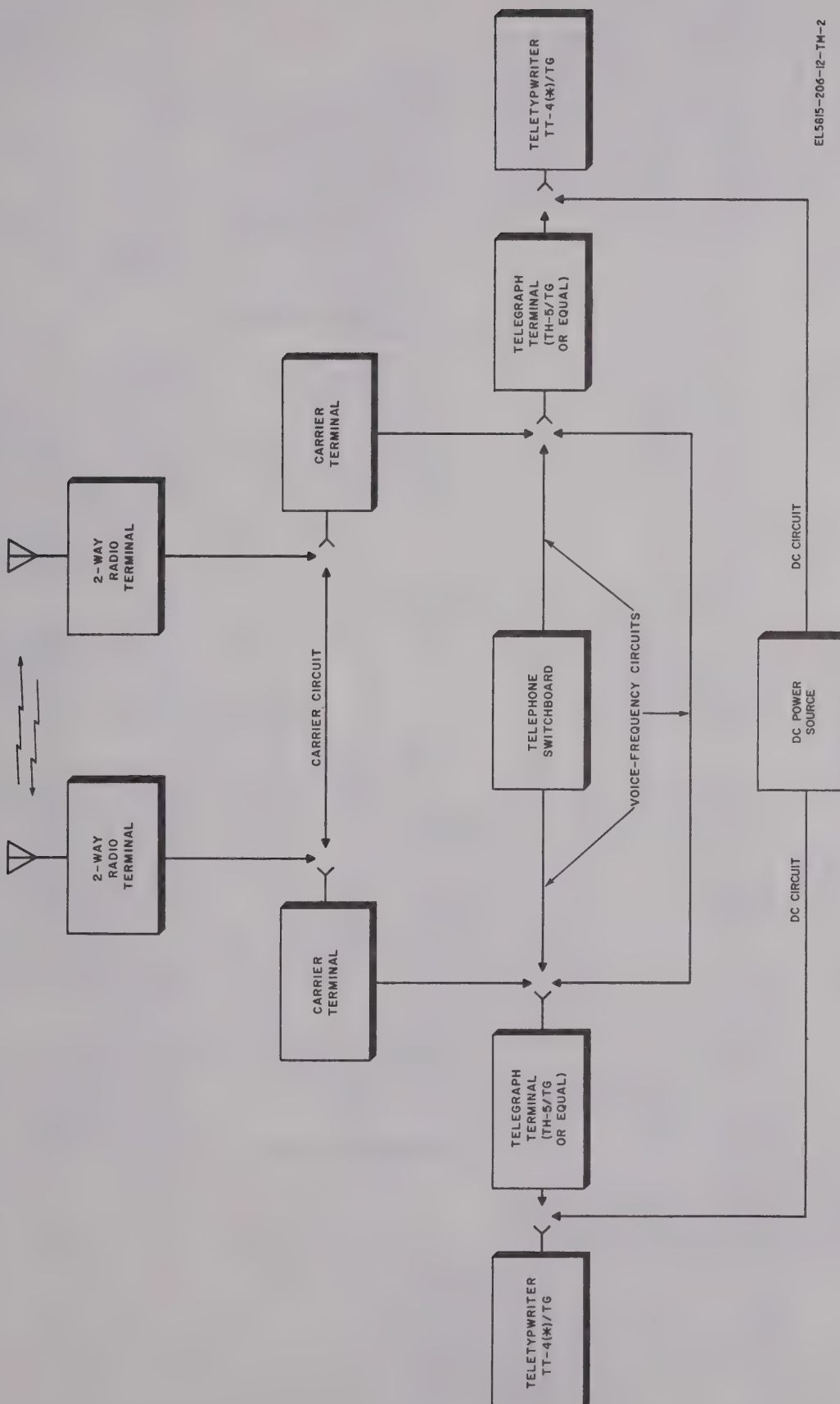


Figure 1-3. Typical system—application options.

c. Circuit Speeds. The teletypewriters are factory-adjusted to operate in 60-words-per-minute (wpm) (368.1 operations-per-minute (opm)) teletypewriter circuits. Accessory gears are included with the TT-4(*)/TG, TT-335/TG, TT-537/G, TT-698(*)/TG, and TT-722(*)/TG for operation at 100 wpm (600 opm). Operation at speeds of 66 wpm (404 opm) is possible with gears which are not part of the AN/PGC-1, AN/PGC-3, TT-4(*)/TG or TT-698(*)/TG.

1-8. Tabulated Data

Motor:	
TT-4(*)/TG, TT-698(*)/TG and TT-722(*)/TG	Approx 150 watts
TT-335/TG and TT-537/G	Approx 200 watts
Signal circuit:	
TT-4(*)/TG	Approx 10 watts
TT-698(*)/TG	Approx 12 watts
Voltage requirements:	
TT-4(*)/TG, TT-722(*)/TG	105 to 125 dc or ac (50-60 Hz, single phase)
TT-335/TG, TT-537/G	108 to 132 volts (396 to 404 Hz, single phase)
TT-698(*)/TG	105 to 125 volts ac (50-60 Hz, single phase)
Signal circuit:	
TT-4(*)/TG, TT-335/TG, TT-722(*)/TG	105-125 volts dc
TT-537/G	6(±) volts or 120-130 volts dc
TT-698(*)/TG	6(±) volts
Service range (direct wire, 60 ma line current):	
60 wpm	25 miles*
100 wpm	15 miles*
Speed options:	
Words per minute (para 1-7c)	60 (368.1 opm) 66 (404 opm) 66 (404 opm) 75 (460 opm) 100 (600 opm)
Type of signals	Dc, neutral, 20 or 60 ma Dc, polar ±6 vdc
Signal code	Five unit, start-stop; stop impulse length equals start impulse length multiplied by 1.42.
Symbols	Standard communications
Type of characters	English
Printer characters per line	72
Signal distortion tolerances:	
Transmitted signals	±5% max
Received signals:	
Bias tolerance Maximum marking or spacing):	
60 wpm opm	40 percent
100 wpm	35 percent
End distortion tolerance (maximum, marking or spacing):	
60 wpm	35 percent
100 wpm	30 percent
Orientation range:	
60 wpm	72 divisions on RANGE dial
100 wpm	60 divisions on RANGE dial
Type of paper feed	Friction
Paper capacity	Single-, double-, or triple-copy roll; 8½-inch width, 4¾-inch maximum diameter. (Only single-copy recording paper is furnished as part of TT-4(*)/TG).
Suppression	Teletypewriters do not interfere with radio reception at frequencies between 0.35 and 150 megacycles when located 1 foot or more from radio antenna.
Motor:	
Type	Series-governed (TT-4(*)/TG, TT-698(*)/TG, and TT-722(*)/TG; synchronous (TT-335/TG and TT-537/(G).
Speed	3600 rpm (TT-4(*)/TG, TT-698(*)/TG and TT-722 (*)/TG); 12,000 rpm (TT-335/TG and TT-537/G).
Humidity tolerance	Equipment withstands high humidity and moisture as encounted in tropics; it is fungiproofed and resistant to corrosion.
Temperature ranges:	
Equipment in use	+32°F (0°C) to +130°F (+55.6°C), (TT-4(*)/TG); −25°F (−32°C) to +132°F (+55.6°C) (TT-335/TG and TT-537/G)
Equipment in storage	−80°F (−62°C) to 160°F (+71.1°C)

*Approximate range, using a field-wire, ground return circuit (para 2-16) with both field wire conductors connected in parallel (both wires used for metallic part of the circuit). Actual range will vary in accordance with the type of wire used and the type and condition of the circuit.

b. Teletypewriters TT-335/TG and TT-537/G.

NSN	Qty	Nomenclature, part No. and mfg code	Fig. No.	Dimensions (in.) Height	Depth	Width	Weight (lb)	Usable on code
5815-00-878-8449		Teletypewriter TT-335/TG		11-1/8	17-3/8	20-1/4		
5815-00-926-7378		Teletypewriter TT-537/G consisting of:		11-1/8	17-3/8	20-1/4		
		NOTE The part number is followed by the applicable 5-digit Federal supply code for manufacturers (FSCM) identified in SB 708-42 and used to identify manufacturer, distributor, or Government agency, etc. In usable on code column the numeral 1 refers to TT-335/TG and the numeral 2 refers to TT-537/G.						
	1	Teletypewriter TT-335/TG (Basic Component)						
	1	Teletypewriter TT-537/G (Basic Component)	1-8					
5995-00-089-4251	1	Cable Assembly, (Line) Special Purpose, Electrical 51908A, 82423	1-6					2
5815-00-682-8785	1	Cover, Teletypewriter, 57730A, 82423	1-11					1,2
3020-00-892-4574	1	Gear, Worm, 64864 (60 wpm), 82423	1-14					1,2
3020-00-892-4573	1	Gear, Worm, 64933 (100 wpm), 82423	1-10					1,2
3020-00-892-4572	1	Gear, Spur 64862A (60 wpm), 82423	1-14					1,2
3020-00-892-4571	1	Gear, Spur 64932A (100 wpm), 82423	1-10					1,2
7530-00-223-7966	1	Paper, Recording, Teletypewriter, UU-P-547C	1-4					1,2
7510-00-082-2648	1	Ribbon, Printing, Teletypewriter, 10901, 82423	1-4					1,2
5815-00-356-3371	1	Shaft Assembly SC-B-70404	1-14					1,2
5815-00-356-3227	1	Spool, Printing, Ribbon, 10900, 82423	1-14					1,2

c. Teletypewriter Sets AN/PGC-3, TT-698/TG, TT-698A/TG and TT-698B/TG.

NSN	Qty	Nomenclature, part No. and mfg code	Fig. No.	Dimensions (in.) Height	Depth	Width	Weight (lb)	Usable on code
5815-01-012-8773	1	Teletypewriter, Set AN/PGC-3 consisting of:						
		NOTE In Usable On Code Column, the numeral 1 refers to the TT-698/TG; numeral 2 refers to the TT-698A/TG; numeral 3 refers to the TT-698B/TG.						
	1	Teletypewriter TT-698/TG (Basic Component)	1-7	11-1/4	18-7/8	22-1/2	44	
	1	Teletypewriter TT-698A/TG (Basic Component)	1-7	11-1/4	18-7/8	22-1/2	44	
	1	Teletypewriter TT-698B/TG (Basic Component)	1-7	11-1/4	18-7/8	22-1/2	44	
	1	Cover, Teletypewriter, 51490A 82423	1-11	10-1/2	18	21	5-1/4	1
5815-00-682-8785	1	Cover, Teletypewriter, 57730A, 82423	1-11	10-1/2	18	21	5-1/2	2,3
3020-00-203-1327	1	Gear, Worm SC-B-70482 (100 wpm)	1-10					1,2,3
3020-00-203-1678	1	Gear, Worm SC-B-69681 (60 wpm)	1-14					1,2,3

NSN	Qty	Nomenclature, part No. and mfg. code	Fig. No	Dimensions (in.)			Weight (lb)	Usable on code
				Height	Depth	Width		
5815-00-351-7944	1	Gear, Spur SC-B-70478 (100 wpm)	1-10					1,2,3
	1	Gear, Spur SC-B-70492 (60 wpm)	1-14					1,2,3
7530-00-223-7966	1	Paper, Recording, Teletypewriter W-P-547C	1-4	4-1/2' Dia roll		8-1/2	3	1,2,3
7510-00-082-2648	1	Ribbon Printing, Teletypewriter 10901, 82423	1-4					1,2,3
5815-00-356-3371	1	Shaft Assembly 50605A, 82423	1-14					1,2,3
5815-00-356-3227	1	Spool, Printing, Ribbon 10900, 82423	1-14					1,2,3
5815-00-224-9717	1	Tuning Fork SC-D-79237	1-14					1,2,3

d. Teletypewriters TT-722/TG and TT-722A/TG.

NSN	Qty	Nomenclature, part No. and mfg code	Fig. No.	Dimensions (in.)			Weight (lb)	Usable on code
				Height	Depth	Width		
5815-01-017-9172		Teletypewriter TT-722, A/TG consisting of:						
		NOTE						
		In Usable on Code column, the numeral 2 refers to TT-722/TG; numeral 3 refers to TT-722A/TG.						
	1	Teletypewriter TT-722/TG (Basic Component)	1-7	11¼	18-7/8	22½	44	
	1	Teletypewriter TT-722A/TG (Basic Component)	1-7	11¼	18-7/8	22½	44	
5815-00-682-8785	1	Cover, Teletypewriter, 57730A, 82423	1-11	10-½	18	21	5-½	2,3
3020-00-203-1327	1	Gear, Worm SC-B-70482 (100 wpm)	1-10					2,3
3020-00-203-1678	1	Gear, Worm SC-B-69681 (60 wpm)	1-14					2,3
5815-00-351-7944	1	Gear, Spur SC-B-70478 (100 wpm)	1-10					2,3
	1	Gear, Spur SC-B-70492 (60 wpm)	1-14					2,3
7530-00-223-7966	1	Paper, Recording, Teletypewriter W-P-547C	1-4	4-½ Dia roll		8-½	3	2,3
7510-00-082-2648	1	Ribbon Printing, Teletypewriter 10901, 82423	1-4					2,3
5815-00-356-3371	1	Shaft Assembly 50605A, 82423	1-14					2,3
5815-00-356-3227	1	Spool, Printing, Ribbon 10900, 82423	1-14					2,3
5815-00-224-9717	1	Tuning Fork SC-D79237	1-14					2,3

NOTE

National Stock Numbers (NSN) not listed in the above charts were not available at the time of printing of this publication. Upon assignment, they will be included in the next change to this manual.

1-10. Expendable Consumable Supplies and Materials

Expendable Consumable Supplies and Materials are listed in table 1-1.

Table 1-1. Expendable Consumable Supplies and Materials

The supplies and materials listed in this table are required for operation of this equipment and are authorized to be requisitioned by SB 700-50. The NSN for the applicable unit of issue required can be found in appropriate supply catalogs. The FSCM is used as an element in item identification to designate manufacturer or distributor or Government agency, etc., and is identified in SB 708-42.

NSN	*Item*	*Use*	*Requisitioning Data*
7530-00-223-7966	Paper, recording, Teletypewriter[a]	Record messages	Fed. Spec. W-P-547C, type 1, class A
7510-00-082-2648	Ribbon, printing, teletypewriter[b]	Records message on paper	Kleinschmidt part No. 10901
5920-00-296-0451	Fuse FO2A250V 1/8 amp.[c]	Protects line circuit	MIL-F-15160/02
5920-00-131-9819	Fuse 1.6 amp. 125 volt[d]	Protects motor	Littlefuse #31301.6
5920-00-581-4144	Fuse, cartridge, 2 amp.[e]	Protects motor	Bussman Part No. MDXZ
5920-00-642-9009	Fuse, cartridge, 3 amp. FO2D3R00B[f]	Protects heater	MIL-F-15160, Part No. MS90078
6240-00-892-6102	Lamp, 120V. 10W. double contact, bayonet candelabra base.[g]	Copy lamp	G.E. #10C7/5DC
TM 11-5815-206-12	Technical manual[h]	Operator's and organizational maintenance	Publications request

[a] 2 ea. rolls furnished with equipment.
[b] 2 ea. furnished with equipment.
[c] 7 ea. furnished with TT-4(*)/TG, TT-335/TG, TT-537/G, TT-698(*)/TG, and TT-722(*)/TG (1 mounted, 6 spare).
[d] 7 ea. furnished with TT-4(*)/TG, TT-698(*)/TG, and TT-722(*)/TG (1 mounted, 6 spare).
[e] 7 ea. furnished with TT-335/TG and TT-537/G (1 mounted, 6 spare).
[f] 6 ea. furnished with TT-335/TG and TT-537/G (1 mounted, 5 spare).
[g] 2 ea. furnished with TT-4(*)/TG, TT-335/TG, TT-537/G, TT-698(*)/TG, and TT-722(*)/TG (1 mounted, 1 spare).
[h] 1 ea. furnished with TT-4(*)/TG, TT-335/TG, TT-537/G, TT-698(*)/TG, and TT-722(*)/TG

1-11. Common Names

Item	*Common name*
Teletypewriter Set AN/PGC-1 and AN/PGC-3	Teletypewriter set
Teletypewriter TT-4A/TG, TT-4B/TG, TT-4C/TG, TT-335/TG, TT-537/G, TT-698/TG, TT-698A/TG, TT-698B/TG, TT-722/TG, and TT-722A/TG	Teletypewriter
Cases CY-694/PGC-1 and CY-694A/PGC-1	Case

1-12. Description

The teletypewriter set consists of a lightweight teletypewriter (fig. 1-1) and a canvas bag which contains three cable assemblies (fig. 1-5. Only the power cable is furnished with the TT-698(*)/FG.

a. The teletypewriter includes a send-receive teletypewriter (fig. 1-7), a wooden transportation and storage case (fig. 1-1), a dust cover (fig. 1-7), an immersionproof cover (fig. 1-11), a set of running spares (fig. 1-4), a tuning fork, mounted within the dust cover, and an accessory worm and worm gear (fig. 1-6). The teletypewriter base includes hooks for lashing the teletypewriter to a packboard for manual transport (fig. 1-11 and 1-12). The immersionproof cover is held to the teletypewriter base with spring-loaded clamps. The dust cover includes a window, copyholder, operating instruction panel, and hinged doors (fig. 1-7).

b. The major mechanical subdivisions of the teletypewriter include the keyboard transmitter (fig. 1-9), type-bar carriage, platen assembly, selector mechanism, paper storage assembly (fig. 1-10), the motor and accessory gears, all secured to the main frame assembly of the teletypewriter. A line terminal board and a control panel are mounted on the left-front corner of the teletypewriter under the dust cover (fig. 1-9).

1-13. Difference in Models

a. Teletypewriters TT-4(*)/TG and TT-698(*)/TG are high level and low level signaling units, respectively; they are identical operationally, except that the TT-698(*)/TG operates from an ac source only whereas the TT-4(*)/TG will operate from either an ac or dc source. The only physical difference of significance to the operator are:

(1) The key tops of the TT-4A/TG and TT-698/TG are round (fig. 1-9); the key tops of all other models are square (fig. 2-5).

(2) The dust cover of the TT-4A/TG and TT-698/TG is held to the base with springs and dust cover mounting studs (fig. 1-11); the dust covers of all other models are held to the base with a C-shaped cam lock on each side of the cover.

(3) All models, except the TT-4A/TG and TT-698/TG, include a blocking plate (fig. 2-2), which is used to prevent movement of the carriage-return driving gear during shipment. The blocking plate is not included with the TT-4A/TG and TT-698/TG.

(4) The location of that portion of the ribbon sensing level that must be operated manually when removing and replacing the inking ribbon is as follows:

(a) On all models, except the TT-4A/TG and TT-698/TG, it is located toward the center of the type-bar carriage, below its associated ribbon cup (fig. 3-5).

(b) On the TT-4A/TG and TT-698/TG, it is located toward the outer side of the type-bar carriage, below its associated ribbon cup (fig. 1-9).

(5) The TT-537/G is provided with platen and carriage locks which can be applied and released without removing the dust cover as shown in figures 2-3 and 2-4.

(6) The TT-537/G is equipped with automatic carriage return and line feed which returns the carriage to the left margin of the unit, and provides a single and/or double line feed to prevent overprinting when the end of the line is reached.

(7) On the TT-537/G, the power cable is permanently wired to the teletypewriter. When the unit is packed to be transported, the power cable is wound around the dust cover and the connector is clamped to the clamping device on the left front of the dust cover before the immersionproof cover is installed (fig. 1-8). The line cable is shipped loose in a bag (fig. 1-6), and it is plug-connected, through a hole in the dust cover, to the teletypewriter line jack (fig. 1-8). Under emergency conditions, the signal lines can be connected directly to terminals 3 and 4 (term. 3 negative) of the line terminal board (A, fig. 2-6).

(8) The TT-537/G is designed for operation on conventional 120- to 130-volt dc signal circuits or for the reception of 6-volt signals. The TT-537/G includes a solid-state amplification system which increases the low-level signals (6 volts) to the higher voltage required to operate the selector magnet.

(9) The TT-335/TG and the TT-537/G are equipped with casting heaters which maintain the equipment at operating temperatures in extremely cold weather. The heaters are electrically operated and are controlled by the operation of a three-position LIGHT-HEATER switch (B, fig. 3-1); an additional fuse protects the heater circuit. The TT-4(*)/TG includes a two-position LIGHT switch (A, fig 3-1).

(10) The motors of the TT-335/TG and TT-537/G are designed for operation with 108- to 132-volt, 396- to 404-cps alternating current.

(11) The paper storage assembly of the TT-537/G is equipped with retaining levers instead of retaining springs to assure positive retention of the paper roll during transport (fig. 3-4).

(12) All original TT-537/G units included a keyboard. However, some units were reworked on Work Order No. C9409887 and do not include a keyboard or remote motor control circuitry.

(13) The TT-4(*)/TG power cable assembly includes a two-pin connector. The TT-335/TG power cable assembly includes a three-pin, twist-lock connector. The TT-537/G power cable assembly includes a five-pin connector.

(14) The TT-698(*)/TG teletypewriters operate on a line current of less than 100 microamperes. Additionally, the high level interface operation, motor stop function, and dc source input are not included in the TT-698(*)/TG teletypewriters.

(15) Cases CY-694/PGC-1 and CY-694A/PGC-1 are identical except that the CY-694A/PGC-1 includes straps and two wooden troughs for securing two rolls of recording paper to the lid of the case (fig. 2-12 and 2-1), instead of one roll as with the CY-694/PGC-1.

b. Teletypewriters TT-722(*)/TG and TT-4B,C/TG are identical operationally, except that the TT-722(*)/TG is equipped with automatic carriage return and line feed which returns the carriage to the left margin of the unit, and provides a single and/or double line feed to prevent overprinting when the end of the line is reached.

2-14. Connections for Operation in FADAC System (TT-537/G)

Turn off all equipment. Insert the telephone-type plug at the end of the line cable (fig. 1-6) into the mating connector on the front panel (fig. 3-1.1) or behind the hole in the left side of the TT-537/G dust cover (fig. 1-8). Connect the 55-pin connector of the line cable to the mating connector of the computer. If the telephone-type plug is damaged, connect the signal lines directly to line terminals 3 (—) and 4 (+).

2-15. Connections for Full-Duplex Operation

a. High Level Units (B, fig. 2-8).

(1) Loosen the nuts of terminals 1 through 6 of the line terminal board (B, fig. 2-6) and move both shorting bars on the line terminal board to the vertical position (lower end of bars not in contact with any lower terminal).

(2) Connect one of the two *receive* signal lines to terminal 3; connect the other signal line to terminal 4. If the pointer of the D.C. MILLIAMPERES meter (A, fig. 3-1) does not move to the right, reverse the connections to terminals 3 and 4.

(3) Connect either of the *send* signal lines to terminal 1; connect the other signal line to terminal 2.

(4) Connect the two leads of Power Cable Assembly CX-1202/1U (fig. 1-5) to terminals 5 and 6. Connect the plug on the other end of the CX-1202/U to a 105-125-volt, dc power source.

NOTE

When connected for full-duplex operation ((1) through (4) above), each station normally provides power only for the signal circuit connected to its SEND terminals (send circuit). To provide power at a station for the receive circuit also, connect one of the receive signal lines to terminal 6 (instead of terminal 3 ((2) above) connect a jumper from terminal 3 to terminal 5, and make all other connections exactly as described in ((1) through (4) above. See caution, paragraph 2-11*b*.

b. Low Level Units (TT-698(*)/*TG*) (C, fig. 2-8).

(1) Connect the two *send* signal lines to the XMIT OUT terminals of A1TB1.

(2) Connect the two *receive* signal lines to the RCVR IN terminals of A1TB1.

(3) Connect signal lines ground shields to the GRD terminal of A1TB1.

2-16. Connections for Ground-Return Signal Circuit

A ground-return signal circuit includes only one metallic path between two stations; the earth is used as the return path to complete the circuit. Establish a ground-return signal circuit as follows at each station:

a. Establish a good ground connection point as described in paragraph 2-7*b* (2).

b. Connect an insulated wire from the ground connection point to one of the two line terminal board terminals that are associated with the signal circuit.

c. Connect the signal line to the other terminal associated with the signal circuit.

2-17. Line Current Adjustment (TT-4(*)/TG and TT-335/TG)

For circuit line-up purposes, one of the stations (normally the station of highest authority) is designated the control station and the others are designated noncontrol stations. Be sure the LINE INCREASE knob (fig. 3-1) is fully counterclockwise at the control station and fully clockwise at all noncontrol stations before beginning the line current adjustment procedure during installation of the teletypewriter.

a. Half-Duplex Operation (*Dc System*) (A, fig. 2-7).

(1) The operator at the control station must slowly turn the LINE INCREASE knob clockwise until the pointer of the D.C. MILLIAMPERES meter (fig. 3-1) indicates 75 on the meter scale.

(2) If only one station is connected to the control station teletypewriter, the operator at the noncontrol station must slowly turn the LINE INCREASE knob counterclockwise until the pointer of his meter indicates 60 on the meter scale. If more than one noncontrol station is in the circuit, the operator at each noncontrol station, in turn, must turn his LINE INCREASE knob counterclockwise slowly to decrease the meter reading in equal amounts until the meter indicates 60 (*for example,* in a three-station circuit, each of the two noncontrol stations would decrease the current reading approximately 7½ ma).

b. Half-Duplex Operation (Voice-Frequency System) (B, fig. 2-7). Turn the LINE INCREASE knob clockwise slowly until the pointer indicates 20 milliamperes on the meter scale.

c. Full-Duplex Operation (B, fig. 2-8). Turn the LINE INCREASE knob clockwise slowly until the pointer indicates 60 milliamperes on the meter scale.

NOTE

When a TT-4(*)/TG is installed for full-duplex operation (B, fig. 2-8), the LINE INCREASE knob is used to adjust the value of current in the receive circuit only

(circuit that is connected to terminals 3 and 4). The value of current in the send circuit (circuit that is connected to terminals 1 and 2) must be adjusted by the operator at the distant end of that circuit.

d. Receive-Only Operation (A, fig. 2-8). Turn the LINE INCREASE knob clockwise slowly until the pointer indicates 60 ma on the meter scale.

2-18. Line Current Adjustment (TT-537/G)

After the signal line connections are made and the computer is energized to provide a continuous marking condition on the line, adjust the LINE INCREASE potentiometer until the MILLIAMPERES meter indicates 20 ma.

2-19. Line Current Adjustment (TT-698(*)/TG)

On the TT-698(*)/TG the line current is established by the input circuit resistance of the receiver module. The line current is approximately 100 micro-amperes. The LINE INCREASE control is used on TT-698(*)/TG, low level units to adjust the selector magnet current to an optimum value. With either a continuous mark test signal or A1TB1, terminals 1 and 2 jumpered to terminals 4 and 5 and the keyboard stopped, adjust the LINE INCREASE potentiometer until the DC MILLIAMPERES meter indicates exactly 20mA.

2-20. ARMATURE and RANGE Dials Adjustment

(fig. 3-1)

NOTE

Be sure the line current is of the proper value (para 2-17) before this adjustment is made. On the TT-698(*)/TG, insure the selector magnet current is set at the optimum value (para 2-19).

The ARMATURE and RANGE dials, as shown in figure 3-1, are associated with the page printer portion of the teletypewriter. *Continuous* reception of test signals (usually alternate R and Y signals, transmitted from the distant station) is necessary for adjustment of these dials. Arrange to have these signals transmitted from the distant station and adjust the dials as described in *a* through *d* below.

a. ARMATURE Dial Preliminary Adjustment.

(1) Loosen the RANGE dial lock, set the RANGE dial at 65, and tighten the dial lock.

(2) Loosen the ARMATURE dial lock and turn the ARMATURE dial counterclockwise *slowly* until the page printer begins to print errors. Note the dial position at that point.

(3) Turn the ARMATURE dial clockwise *slowly* until the page printer resumes printing correctly. Continue turning the dial clockwise until the page printer again begins to print errors. Note the dial position at that point.

(4) Set and lock the ARMATURE dial midway between the two readings ((2) and (3) above).

b. RANGE Dial Preliminary Adjustment.

CAUTION

Never change the position of the RANGE dial while the page printer is idle.

(1) Loosen the RANGE dial lock and turn the RANGE dial counterclockwise *slowly* until the page printer begins to print errors. Note the dial position at that point.

(2) Turn the RANGE dial clockwise *slowly* until the page printer resumes printing correctly. Continue turning the dial clockwise until it again begins to print errors. Note the dial position.

(3) Set and lock the RANGE dial midway between the two readings (1) and (2) above.

c. ARMATURE Dial Final Adjustment. This adjustment is identical with the ARMATURE dial preliminary adjustment (*a* above) except that it is performed *after* the RANGE dial preliminary adjustment (*b* above) and that step in *a*(1) above is omitted.

d. RANGE Dial Final Adjustment. This adjustment is identical with the RANGE dial preliminary adjustment (*b* above) except that it is performed *after* the ARMATURE dial *final* adjustment.

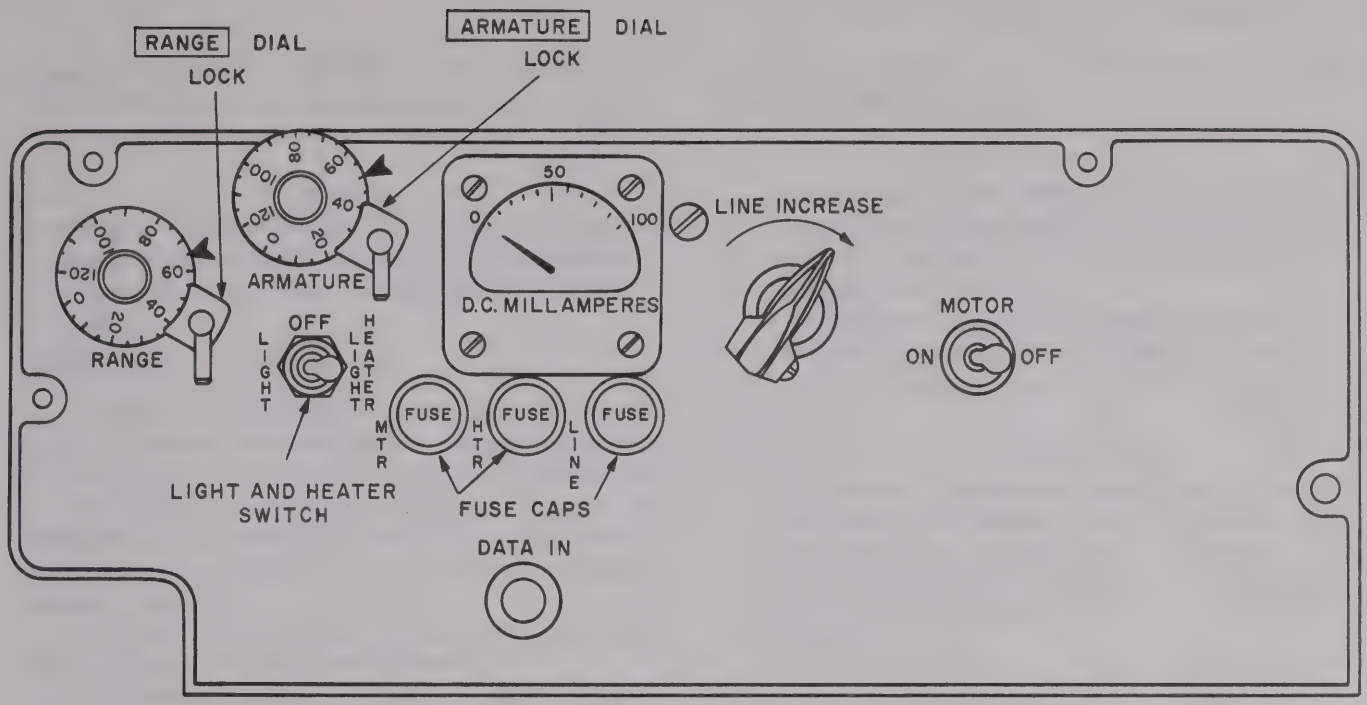
2-21. Installation Final Test

After installation, perform a complete operational test of the teletypewriter before beginning the transmission of official traffic.

a. Make the checks listed in the equipment performance check list, as described in paragraph 4-8.

b. Have the distant operator transmit a test message and observe the typewritten copy. The conventional test message is as follows: "THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG's BACK 123456789-$!"( )"/-:;?,.".

c. Transmit the same test message to the distant station for a performance test of the equipment at the distant station.



EL2ZK001

Figure 3–1.1. Control panel for TT–537/G, without keyboard.

NOTE

1. Motor switch on TT–537/G (with keyboard) is located on the keyboard (fig. 2–5).
2. DATA IN connector on TT–537/G (with keyboard) is located in the left side of the unit (fig. 1–8).

operate the LIGHT-HEATER switch to the LIGHT-HEATER position to maintain the required temperatures of operating parts.

NOTE

Teletypewriters TT-537/G, without keyboard, do not include a BREAK switch. On these units, the motor is controlled by the MOTOR switch only.

3-8. Operating Procedure

a. Transmitting Messages (Not Applicable to TT-537/G). Message transmission is possible only when the teletypewriter is installed for either half-duplex or full-duplex operation. To transmit, operate the keys of the keyboard (fig. 2-5) in a way similar to that used when typing with an ordinary typewriter except as follows:

(1) Press the CAR. RET. key to return the type-bar carriage to the left-hand margin.

(2) Press the LINE FEED key to move the recording paper upward for the printing of a new line.

(3) Press the FIGS key to move the platen to the figures-shift position.

(4) Press the LTRS key to move the platen to the letters-shift position.

(5) Press the FIGS key and then the BELL key to signal the distant operator.

(6) Hold down the space bar to cause the type-bar carriage to move from left to right without printing. Release the space bar when the carriage has reached to the point at which printing is to begin.

b. Receiving Messages. Incoming messages are received and printed automatically by the page printer. Ocassionally, during reception, make the following checks:

(1) Check the printed copy to be sure that the page printer is operating properly.

(2) Check the recording paper to be sure that it is properly centered on the platen and that the paper supply is not running low.

NOTE

As the end of the paper nears, a red stripe appears down the center of the paper. This stripe is a warning that a new roll of paper must be installed.

(3) Examine the inking ribbon to be sure it is not twisted in the ribbon guide and that the ribbon is being unwound from one spool onto the other spool.

NOTE

To prevent accidental transmission during reception of a message, loosen the locknut (fig. 2-5), push the keyboard lock to the rear, and tighten the locknut. To permit later transmission, move the keyboard lock to the forward position.

3-9. Stopping Procedure

To stop the teletypewriter, use the applicable procedure described below.

a. Standby Condition (Not Applicable to TT-537/G and TT-698(*)/TG). To place all interconnected teletypewriters equipped with the motor-stop feature in the standby condition, press the FIGS key and then the STOP key (upper-case H). This action will cause the motors of all teletypewriters to stop. An operator at any of the teletypewriters can start all the motors by pressing and releasing the BREAK key. This feature permits an operator to start all teletypewriters, transmit his message, and stop all teletypewriters.

b. Complete Shut Down. To close a teletypewriter to traffic, move the MOTOR switch as shown in figure 1-9 and LIGHT (or LIGHT-HEATER) switch as shown in B, figure 3-1 to OFF.

4-8. Equipment Performance Checklist

Item No.	Item	Action	Normal indication	Corrective measures
1	D. C. MILLIAMPERES meter (fig. 3-1).	If current for signal circuit is to be furnished locally, turn on local dc power source. No action if signal circuit current is furnished by distant station.	For TT-4(*)/TG and TT-335/TG, meter indicates 20 ma if LINE switch (fig. 3-1) is in VOICE FREQ LINE position. Meter indicates 60 ma if switch is in DC LINE position. For the TT-537/G, in use with FADAC system, LINE switch is locked in VOICE FREQ LINE position and meter indicates 20 ma. Line current is not adjustable on the TT-698(*)/TG.	If meter indicates zero: Check for loose connection to dc power source (if current for signal circuit is supplied locally). Tighten loose connection. Check for loose signal line connection to line terminal board (fig. 2-6). Tighten loose line connection.
			The meter indicates selector magnet current normally set to 20mA. Also, the line switch is not applicable to the TT-698(*)/TG.	Check seating of cable plugs in associated equipment jacks if Cable Assemblies CX-1200/U and CX-1201/U (fig. 1-5) are used. Press plugs into jacks firmly. Check LINE FUSE (fig. 3-1). Replace fuse if blown. If meter indicates presence of current but not of proper value, adjust LINE INCREASE knob (fig. 3-1) to obtain proper current value (see normal indication for item 1).
2[a]	BREAK switch (fig. 2-5)	Press momentarily	Pointer of D.C. MILLIAMPERES meter moves to zero and back to proper current value (see item 1 above) if teletypewriter is installed for half-duplex operation (fig. 2-7). No change in pointer position for receive-only and full-duplex operations (fig. 2-8).	Higher category of maintenance is required.
3	LIGHT switch (fig. 3-1).	Move to ON	Copy lamp in dust cover should light.	Check to be sure motor power cord is fully seated in ac power receptacle. Press dust cover downward to insure proper seating of cover on base. Check lamp; replace if defective.
4	MOTOR switch (fig. 2-5)	Move to ON	Motor should start	Press and release BREAK switch (fig. 2-5). Check MOTOR fuse (fig. 3-1) Replace if blown (para 4-9*b*).
5[a]	Governor target (fig. 1-9)	Check motor speed with tuning fork (para 2-8).	Spots on target should appear stationary.	Adjust motor speed (para 2-8). (Not applicable to TT-335/G). If motor speed to TT-335/TG is incorrect, higher category of maintenance is required.

Item No.	Item	Action	Normal indication	Corrective measures
6	Keyboard keys[a]	Transmit test message	Test message correctly printed by page printer.	Have distant station transmit test message. If this test message is printed correctly by page printer, higher category of maintenance of keyboard transmitter is required. If page printer prints incorrect copy regardless of source of signals, check adjustment of ARMATURE and RANGE dials (para 2-19).
7	FIGS key (fig. 2-5)[a]	Press and release	Platen (fig. 1-9) moves to upper (figures-shift) position.	Higher category of maintenance is required.
8	LTRS key (fig. 2-5)[a]	Press and release	Platen moves to lower (letters-shift) position.	Higher category of maintenance is required.
9	LINE FEED key[a]	Move single-double linefeed lever (fig. 3-2) to lower position and press LINE FEED key.	Platen turns slightly to move printed line upward 1-line space.	Higher category of maintenance is required.
		Move single-double line-feed lever to upper position and press LINE FEED key.	Platen moves printed line upward 2-line spaces.	Higher category of maintenance is required.
10	Space bar (fig. 2-5)[a]	Press and immediately release.	Type-bar carriage (fig. 1-9) moves 1 space to the right.	Higher category of maintenance is required.
		Press and hold down	Type-bar carriage moves to extreme right margin. Margin bell rings 6 spaces before carriage reaches right margin.	Higher category of maintenance is required.
11	CAR RET key[a]	Press and release	Type-bar carriage moves to left margin.	Higher category of maintenance is required.
12	BELL (upper-case S) key[a]	Press FIGS key and then BELL key.	Signal bell rings (sound is much louder than margin bell (item 10 above)).	Higher category of maintenance is required.
13	STOP (upper-case H) key[a]	Press FIGS key and STOP key	Motor stops	Higher category of maintenance is required.
		With motor stopped, press BREAK switch (fig. 2-5).	Motor starts	Higher category of maintenance is required.
14	Keyboard lock (fig. 2-5)[a]	Loosen locknut, move keyboard lock to rear position, tighten locknut, press and release any key of keyboard.	Teletypewriter does not transmit (no effect on page printer).	Higher category of maintenance is required.
		Move keyboard lock to forward position and press key of keyboard.	Page printer prints correct character.	Higher category of maintenance is required.
15	Inking ribbon	Transmit test message.	Ribbon lifted upward by ribbon guide (fig. 3-5) for printing of each character and moved downward after printing.	Check for binding of ribbon in ribbon guide.
			Ribbon slowly unwound from 1 ribbon spool on to other spool.	Check for proper attachment of ribbon to spool (para 3-6*d*(3)).

[a]Not applicable to TT-537/G (receive only operation).

APPENDIX A

REFERENCES

The references listed below are applicable to the operation of Teletypewriter Sets AN/PGC-1, AN/PGC-3, Teletypewriters TT-4(*)/TG, TT-335/TG, TT-537/TG, TT-698(*)/TG, and TT-722(*)/TG:

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (type 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	Index of Modification Work Orders.
CTA 50-970	Expendable Items: (Except Medical, Class V, Repair Parts and Heraldic Items).
SB 708-42	Federal Supply Code for Manufacturers — United States and Canada — Code to Name (Cataloging Handbook H4-2).
TB 43-0118	Field Instructions for: Painting and Preserving Electronics Command Equipment.
TM 11-5805-254-15	Operator's, Organizational, Field and Depot Maintenance Manual: Terminal Telegraph—Telephone AN/TCC-14.
TM 11-6625-1668-12	Operator and Organizational Maintenance Manual Including Repair Parts and Special Tool List: Test Sets, Telegraph AN/GGM-15(V)1 and AN/GGM-15(V)1 and 2.
TM 38-750	The Army Maintenance Management Systems (TAMMS).
TM 740-90-1	Administrative Storage of Equipment
TM 750-244-2	Procedure for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command).

SECTION II MAINTENANCE ALLOCATION CHART
FOR

Teletypewriter Sets AN/PGC-1 and AN/PGC-3, and Teletypewriters TT-4A/TG, TT-4B/TG, TT-4C/TG, TT-335/TG, TT-537/G, TT-698/TG, TT-698A/TG, TT-698B/TG, TT-722/TG, and TT-722A/TG

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT
			C	O	F	H	D	
00	Teletypewriter Sets AN/PGC-1 and AN/PGC-3, and Teletypewriters TT-4( )/TG, TT-335/TG, TT-537/G, TT-698( )/TG, and TT-722( )/TG.	Inspect	0.2[1]					
		Test	0.5[2]		0.6			1 thru 5
		Service	0.2[3]		0.7			1,2
		Adjust			2.5			1 thru 5
		Repair			0.2			1 thru 5
		Overhaul					24.0	1 thru 8
	NOTES 1. Used on TT-4A,B,C/TG and TT-698,A,B/TG only. 2. Used on TT-335/TG only. 3. Used on TT-537/G only.							
01	Immersion Proof Cover	Repair			0.2			2
02	Dust Cover	Repair			0.2			2
03	Governor (See Note 1 above)	Repair			0.4			1,3
03	Motor (See Notes 2 and 3 above)	Repair				0.5		1,2,3
0301	Motor (See Note 1 above)	Repair				0.5		1,2,3
04	Instrument Panel Assembly	Repair			0.6			2,3
05	Transmitter Contact Assembly	Repair			0.5			1,3,5
06	Platen Assembly	Repair			0.7			1
07	Automatic Carriage Return and Line Feed Mechanism (Used on TT-537/G and TT-722( )/TG only)	Repair			0.6			1
08	Line Feed and Platen Shift Mechanism	Repair			0.5			1
09	Ribbon Mechanism Assembly	Repair			0.5			1
10	Margin Bell Assembly	Repair			0.4			1
11	Signal Bell Assembly	Repair			0.4			1
12	Type Bar Mechanism	Repair			0.6			1
13	Carriage Frame Assembly	Repair			0.5			1
14	Carriage Machanism	Repair			0.6			1
15	Paper Trough Assembly (See Note 3 above)	Repair			0.4			1
15	Paper Shaft, Paper Shaft Bracket and Paper Chute (See Notes 1 and 2 above)	Repair			0.4			1
16	Line Terminal Box and Signal Cable Assembly (See Note 3 above)	Repair			0.5			1,2,3
16	Line Terminal Box (See Notes 1 and 2 above)	Repair			0.4			1,2
17	Transmitter Camshaft, Filter and Locking Mechanism	Repair			0.5			1,3
18	Keyboard-Transmitter Sensing and Selector Lever Assembly	Repair			0.5			1,3,5

(1) Exterior
(2) Operational test.
(3) Clean (exterior), replace paper, ribbon, and spool

SECTION II MAINTENANCE ALLOCATION CHART
FOR

Teletypewriter Sets AN/PGC-1 and AN/PGC-3, and Teletypewriters TT-4A/TG, TT-4B/TG, TT-4C/TG, TT-335/TG, TT-537/G, TT-698/TG, TT-698A/TG, TT-698B/TG, TT-722/TG, and TT-722A/TG

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT
			C	O	F	H	D	
19	Key Levers and Code Bars	Repair			0.7			1
20	Print Bail Shaft Assembly	Repair			0.5			1
21	Selector Magnet Assembly	Repair			0.4			1,3,5
22	Motor Stop Assembly	Repair			0.6			1,3
23	Square Shaft Assembly	Repair			0.4			1
24	Carriage Return Shaft and Clutch Assembly	Repair			0.5			1
25	Code Ring Cage and Function Sensing Lever Group	Repair			0.6			1
26	Selector Lever Comb Assembly (See Note 3 above)	Repair			0.4			1
26	Selector-Lever-Comb Bracket Assembly (See Notes 1 and 2 above)	Repair			0.4			1
27	Selector Camshaft Assembly	Repair			0.5			1
28	Selector Levers and Y Levers	Repair			0.7			1
29	Function Selecting Machanism	Repiar			0.5			1
30	Carriage Feed Shaft Assembly	Repair			0.6			1
31	Carriage Rack Drive Shaft	Repair			0.5			1
32	Function Shaft Assembly	Repair			0.7			1
33	Main Shaft Assembly	Repair			0.4			1
34	Keyboard-Transmitter Drive Shaft	Repair			0.5			1
35	Transfer Lever Shaft Assembly	Repair			0.6			1
36	Junction Box Assembly (See Note 3 above)	Repair			0.7			1,2,3
36	Motor Filter Box Assembly (See Notes 1 & 2 above)	Repair			0.7			1,2,3
37	Frame Assembly (See Note 3 above)	Repair			0.4			1,2
37	Teletypewriter Frame Assembly	Repair			0.4			1,2
38	Base Assembly (See Note 3 above)	Repair			0.3			1,2
38	Teletypewriter Base Assembly	Repair			0.3			1,2

TABLE 1. TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR

Teletypewriter Sets AN/PGC-1 and AN/PGC-3, and Teletypewirters TT-4A/TG, TT-4B/TG, TT-4C/TG, TT-335/TG, TT-537/G, TT-698/TG, TT-698A/TG, TT-698B/TG, TT-722/TG, and TT-722A/TG

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	F,D	TOOL KIT, TELETYPE EQUIPMENT MAINTENANCE TE-50B	5180-00-356-4602	
2	F,H,D	TOOL EQUIPMENT TE-111	5180-00-408-1877	
3	O,F,H,D	MULTIMETER TS-352B/U[a]	6625-00-553-0142	
4	F,H,D	OHMMETER ZM-21/U	6625-00-581-2466	
5	F,H,D	TEST SET, TELEGRAPH AN/GGM-15(V) (HIGH OR LOW LEVEL EQUIPMENTS)	6625-00-442-6131	
		NOTE IF TEST SET, TELEGRAPH AN/GGM-15(V) IS NOT AVAILABLE, THE FOLLOWING TEST SETS MAY BE USED (IF AVAILABLE) TO TEST THE AN/PGC-1, TT-4A/TG, TT-4B/TG, TT-4C/TC, TT-335/TG, AND TT-537/G (HIGH-LEVEL, 60-MA OR 30-MA EQUIPMENT).		
6	F,D	TEST SET, TELETYPEWRITER TS-2( )/TG (HIGH LEVEL EQUIP. ONLY)	6625-00-243-5173	
7	H,D	TEST SET, TELETYPEWRITER TS-383/GG (HIGH LEVEL EQUIP. ONLY)	6625-00-222-1714	
8	F,H,D	TEST SET, TELETYPEWRITER AN/UGM-1 (HIGH LEVEL EQUIP. ONLY)	6625-00-965-0195	
		CAUTION TEST SET, TELEGRAPH AN/GGM-15(V) MUST BE USED FOR TESTING THE AN/PGC-3, TT-698/TG, TT-698A/TG, AND TT-698B/TG (LOW-LEVEL, ±6-VOLT POLAR EQUIPMENT). USE OF THE ABOVE HIGH-LEVEL TEST SETS FOR LOW-LEVEL EQUIPMENT TESTING WILL CAUSE DAMAGE TO THE ELECTRONIC COMPONENTS OF THE EQUIPMENT UNDER TEST.		

[a]Authorized for performance of organizational maintenance only when using organization includes either a Teletypewriter Repairman (MOS 31J), or an Organizational Communications Repairman (MOS 31B).

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No. 31W4-2PGC1-61

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON, D.C., *28 May 1976*

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL

FOR

TELETYPEWRITER SETS AN / PGC-1 AND AN / PGC-3 AND TELETYPEWRITERS TT-4A / TG, TT-4B / TG, TT-4C / TG, TT-335 / TG, TT-537 / G TT-698 / TG, TT-698A / TG, AND TT-698B / TG

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*This manual supersedes TM 11-5815-206-12, 8 April 1959, including all changes.

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Figure 1-1. Teletypewriter Set AN/PGC-1, in use.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual describes Teletypewriter Sets AN/PGC-1 (fig. 1-1) and AN/PGC-3, Teletypewriters TT-4A/TG, TT-4B/TG, TT-4C/TG, TT-537/G, TT-698/TG, TT-698A/TG, and TT-698B/TG. It contains instructions for installation, operation and organizational maintenance. The maintenance portion covers the cleaning and inspection of equipment, periodic maintenance service, and the replacement of parts available to organizational personnel.

b. Official nomenclature followed by (*) is used to indicate all models of the equipment item covered in this manual. Thus, Teletypewriter TT-4(*)/TG represents Teletypewriters TT-4A/TG, TT-4B/TG, and TT-4C/TG. Case CY-694(*)/PGC-1 represents CY-694/PGC-1, and CY-694A/PGC-1. Similarily, Teletypewriter TT-698(*)/TG represents Teletypewriter TT-698/TG, TT-698A/TG, and TT-698B/TG.

c. Teletypewriters modified for low level signaling operation have nomenclature changes as follows:

High-level signaling		*Low-level signaling*
TT-4A/FG	becomes the	TT-698/TG
TT-4B/FG	becomes the	TT-698A/TG
TT-4C/FG	becomes the	TT-698B/TG

(1) High-level teletypewriters operate with line currents of 20 or 60 milliamperes.

(2) Low-level teletypewriters operate with line currents of 100 microamperes or less.

d. The maintenance allocation chart appears in appendix C and is current as of 3 September 1975.

1-2. Indexes of Publications

a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

1-3. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750 (Army). Air Force personnel will use AFM 66-1 for maintenance reporting and TO-00-35D54 for unsatisfactory equipment reporting. Navy personnel will report maintenance performed utilizing the Maintenance Data Collection Subsystem (MDCS) in accordance with OPNAVINST 4790.2, Vol 3 and unsatisfactory material/conditions (UR submissions) in accordance with OPNAVINST 4790.2, Vol 2, chapter 17.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Packaging Improvement Report) as prescribed in AR 700-58/NAVSUPINST 4030.29/AFR 71-13/MCO P4030.29A, and DSAR 4145.8.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33A/AFR 75-18/MCO P4610.19B, and DSAR 4500.15.

1-4. Recommendation for Maintenance Publications Improvements

You can improve this manual by recommending improvements using DA Form 2028 (Recommended Changes to Publications and Blank Forms) or DA Form 2028-2 (Test) located in the back of the manual. To use the form in the back of the manual, simply tear it out, fill it out as shown on the sample in figure 1-2, fold it where shown, and drop it in the mail. A reply will be furnished direct to you.

Figure 1-2. DA Form 2028-2 (TEST)—sample.
(Located in back of manual.)

1-5. Administrative Storage

For procedures, forms, and records, and inspections required during administrative storage of this equipment, refer to TM 740-90-1. Refer to chapter 6 for storage preparation instructions that pertain to these teletypewriters.

1-6. Destruction of Army Materiel

Demolition and destruction of electronic equipment will be under the direction of the commander and in accordance with TM 750-244-2, Procedures for Destruction of Equipment to Prevent Enemy Use.

Section II. DESCRIPTION AND DATA

1-7. Purpose and Use

a. Purpose. Teletypewriter Set AN/PGC-1 and Teletypewriters TT-4(*)/TG, TT-335/TG, and TT-698(*)/TG are used to transmit teletypewriter messages in the form of direct-current (dc) teletypewriter signals and to convert received dc signals into messages printed on a roll of recording paper. Teletypewriter TT-537/G is used primarily to receive low-voltage Baudot teletypewriter signals from a field artillery gun direction computer (FADAC) and to record the recieved messages on 8½-inch-wide recording paper.

b. Use (fig. 3). The AN/PGC-1, AN/PGC-3, TT-4(*), TT-335/TG and TT-698(*)/TG are used in tactical military communication systems. Teletypewriters TT-698(*)/TG are Teletypewriters TT-4(*)/TG converted to low level signaling operation. Except for the TT-698(*)/TG's ability to detect and process a much lower level signal, all other existing operational features of the basic teletypewriter TT-4(*)/TG are unchanged. Typical applications are:

(1) *Dc system.* In a typical dc system, the sending teletypewriter transmits dc signals to the receiving teletypewriter over a dc circuit that interconnects the two teletypewriters.

(2) *Voice-frequency system.* In a typical voice-frequency system, the sending teletypewriter transmits dc signals to a telegraph terminal which converts the dc signals to voice-frequency signals. The voice-frequency signals are transmitted to a distant telegraph terminal either through telephone switching equipment or over a direct circuit interconnecting the two telegraph terminals. The distant telegraph terminal converts the voice-frequency signals to dc signals and transmits the dc signals to the receiving teletypewriter.

(3) *Carrier system.* In a typical carrier system, the sending teletypewriter transmits dc signals to a telegraph terminal which converts the dc signals to voice-frequency signals and transmits them to a carrier terminal. The carrier terminal converts the voice-frequency signals to carrier signals and transmits the carrier signals to a distant carrier terminal. The distant carrier terminal converts the received carrier signals to voice-frequency signals and transmits them to a telegraph terminal where the voice-frequency signals are converted to dc signals and transmitted to the receiving teletypewriter.

(4) *Radio-teletypewriter system.* In a typical radio-teletypewriter system, signal transmission is the same as in a carrier system ((3) above), except that transmission between carrier terminals is accomplished over a two-way radio circuit instead of a carrier circuit.

(5) *FADAC system.* In a typical FADAC system, low-voltage signals from the computer are applied to the receive circuits of Teletypewriter TT-537/G, where they are amplified to the level required to operate the selector magnet in the teletypewriter receive mechanism. The keyboard transmission capability is normally not used in this application.

(6) *Low level signaling system.* In a typical low level signaling system line signal current is reduced to 100 microamperes or less.

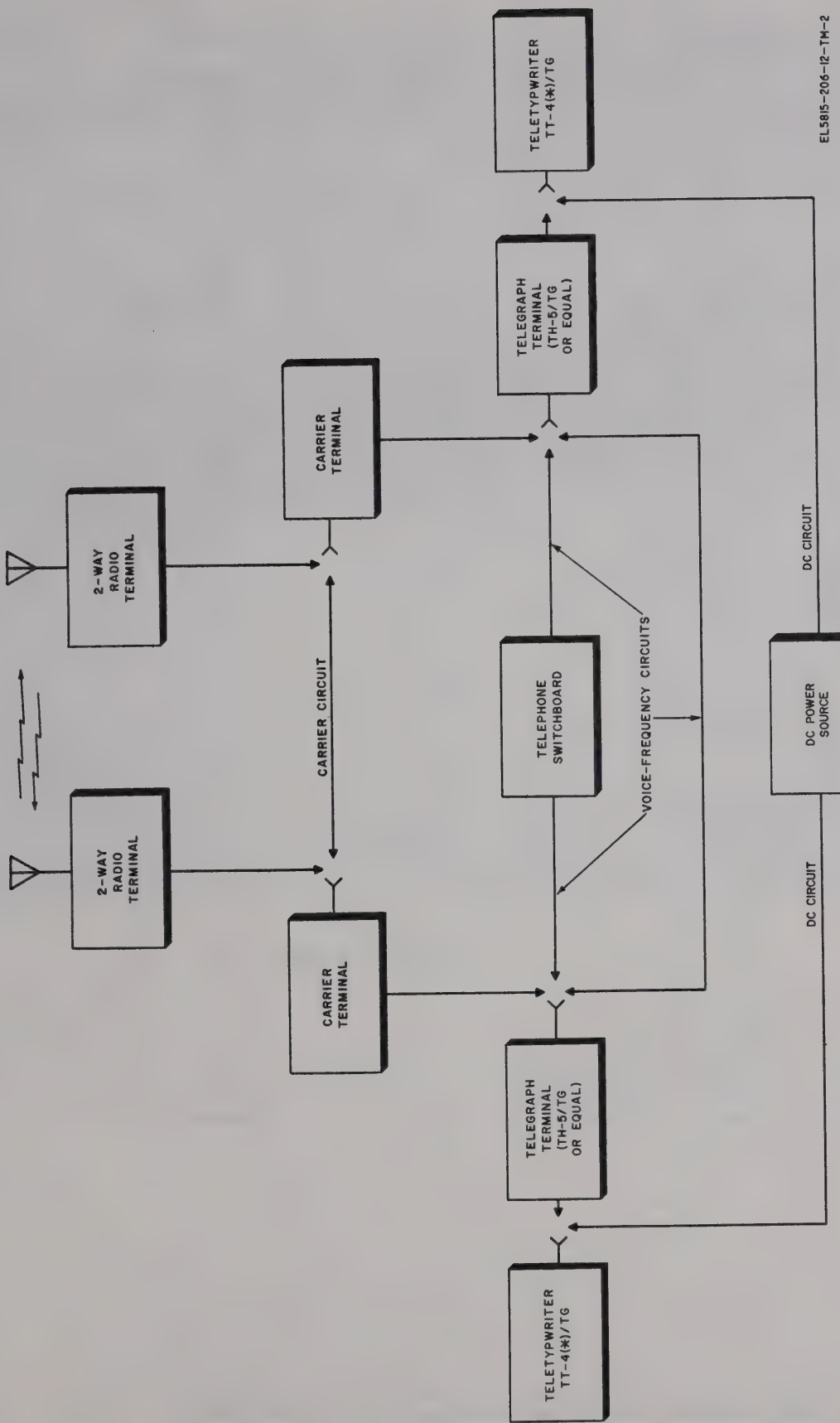


Figure 1-3. Typical system—application options.

c. Circuit Speeds. The teletypewriters are factory-adjusted to operate in 60-words-per-minute (wpm) (368.1 operations-per-minute (opm)) teletypewriter circuits. Accessory gears are included with the TT-4(*)/TG, TT-335/TG, TT-537/G and TT-698(*)/TG for operation at 100 wpm (600 opm). Operation at speeds of 66 wpm (404 opm) is possible with gears which are not part of the AN/PGC-1, AN/PGC-3, TT-4(*)/TG or TT-698(*)/TG.

1-8. Tabulated Data

Type of installation	Tactical
Power consumption:	
Motor:	
TT-4(*)/TG and TT-698(*)/TG	Approx 150 watts
TT-335/TG and TT-537/G	Approx 200 watts
Signal circuit:	
TT-4(*)/TG	Approx 10 watts
TT-698(*)/TG	Approx 12 watts
Voltage requirements:	
T-4(*)/TG	105 to 125 dc or ac (50-60 Hz, single phase)
TT-335/TG, TT-537/G	108 to 132 volts (396 to 404 Hz, single phase)
TT-698(*)/TG	105 to 125 volts ac (50-60 Hz, single phase)
Signal circuit:	
TT-4(*)/TG, TT-335/TG	105-125 volts dc
TT-537/G	6(±) volt or 120-130 volts dc
TT-698(*)/TG	6 (±) volts
Service range (direct wire, 60 ma line current):	
60 wpm	25 miles*
100 wpm	15 miles*
Speed options:	
Words per minute (para 1-7*c*)	60 (368.1 opm) 66 (404 opm) 66 (404 opm) 75 (460 opm) 100 (600 opm)
Type of signals	Dc, neutral, 20 or 60 ma Dc, polar ± 6 vdc
Signal code	Five unit, start-stop; stop impulse length equals start impulse length multiplied by 1.42.
Symbols	Standard communications
Type of characters	English
Printer characters per line	72
Signal distortion tolerances:	
Transmitted signals	±5% max
Received signals:	
Bias tolerance Maximum marking or spacing):	
60 wpm opm	40 percent
100 wpm	35 percent
End distortion tolerance (maximum, marking or spacing):	
60 wpm	35 percent
100 wpm	30 percent
Orientation range:	
60 wpm	72 divisions on RANGE dial
100 wpm	60 divisions on RANGE dial
Type of paper feed	Friction
Paper capacity	Single-, double-, or triple-copy roll; 8½-inch width, 4¾-inch maximum diameter. (Only single-copy recording paper is furnished as part of TT-4(*)/TG).
Suppression	Teletypewriters do not interfere with radio reception at frequencies between 0.35 and 150 megacycles when located 1 foot or more from radio antenna.
Motor:	
Type	Series-governed (TT-4(*)/TG and TT-698(*); synchronous (TT-335/TG and TT-537/G)
Speed	3600 rpm (TT-4(*)/TG and TT-698(*)/TG); 12,000 rpm (TT-335/TG and TT-537/G).
Humidity tolerance	Equipment withstands high humidity and moisture as encounted in tropics; it is fungiproofed and resistant to corrosion.
Temperature ranges:	
Equipment in use	+32°F (0°C) to +130°F (+55.6°C), (TT-4(*)/TG); −25°F (−32°C) to +132°F (+55.6°C) (TT-335/TG and TT-537/G)
Equipment in storage	−80°F (−62°C) to 160°F (+71.1°C)

*Approximate range, using a field-wire, ground return circuit (para 2-16) with both field wire conductors connected in parallel (both wires used for metallic part of the circuit). Actual range will vary in accordance with the type of wire used and the type and condition of the circuit.

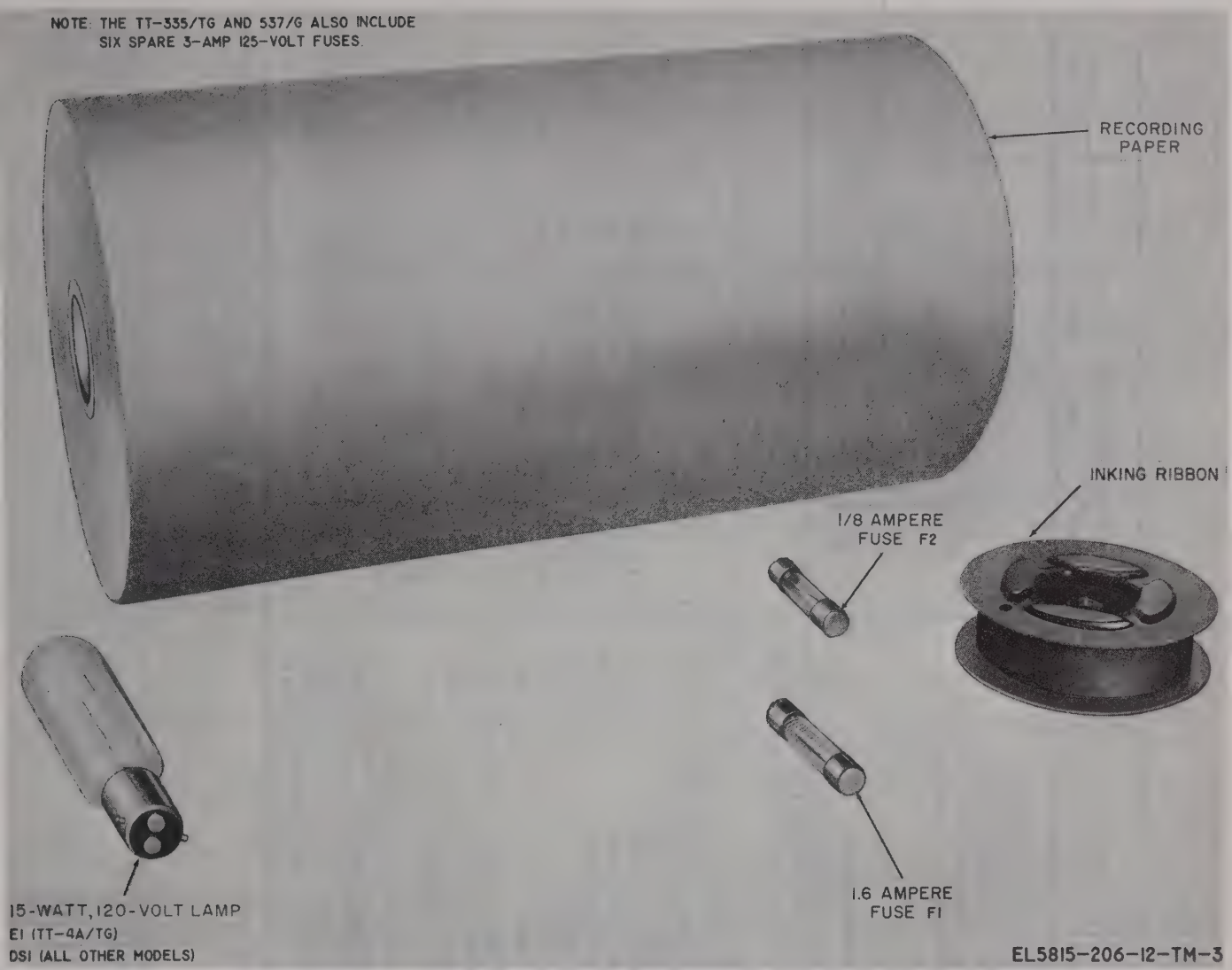


Figure 1-4. Running spares.

1-9. Items Comprising an Operable Equipment

a. Teletypewriter Sets AN/PGC-1, TT-4A,B,C/TG.

NSN	Qty	Nomenclature, part No. and mfg code	Fig. No.	Dimensions (in.) Height	Depth	Width	Weight (lb)	Usable on code
		NOTE The part number is followed by the applicable 5-digit Federal supply code for manufacturers (FSCM) identified in SB 708-42 and used to identify manufacturer, distributor, or Government agency, etc.						
5815-00-198-5963	1	Teletypewriter Set AN/PGC-1 consisting of:						
5995-00-170-8775	1	Cable Assembly, Power, Electrical CX-1202/U	1-5	72" long				
5995-00-170-8780	1	Cable Assembly, Special Purpose, Electrical CX-1200/U	1-5	45 long				
	1	Cable Assembly, Special Purpose, Electrical CX-1201/U	1-5	45 long				
5815-00-198-4438		Teletypewriter TT-4A,B,C/TG consisting of:						
		NOTE In usable on code column the numeral 1 refers to TT-4A/TG; numeral 2 refers to TT-4B/TG; numeral 3 refers to TT-4C/TG.						
	1	Teletypewriter TT-4A/TG (Basic Component)	1-7	11-1/4	18-7/8	22-1/2	44	
	1	Teletypewriter TT-4B/TG (Basic Component)	1-7	11-1/4	18-7/8	22-1/2	44	
	1	Teletypewriter TT-4C/TG (Basic Component)	1-7	11-1/4	18-7/8	22-1/2	44	
5825-00-257-3856	1	Cover, Teletypewriter, 51490A, 82423	1-11	10-1/2	18	21	5-1/4	1
5815-00-682-8785	1	Cover, Teletypewriter, 57730A, 82423	1-11	10-1/2	18	21	5-1/4	2,3
3020-00-203-1327	1	Gear, Worm SC-B-70482 (100 wpm)	1-10					1,2,3
3020-00-203-1678	1	Gear, Worm SC-B-69681 (60 wpm)	1-14					1,2,3
3020-00-351-7944	1	Gear, Spur SC-B-70478 (100 wpm)	1-10					1,2,3
	1	Gear, Spur SC-B-70492 (60 wpm)	1-14					1,2,3
7530-00-223-7966	1	Paper, Recording, Teletypewriter UU-P-547C	1-4	4-1/2 dia. roll		8-1/2	3	1,2,3
7510-00-082-2648	1	Ribbon Printing, Teletypewriter 10901, 82423	1-4					1,2,3
5815-00-356-3371	1	Shaft Assembly 50605A, 82423	1-14					1,2,3
5815-00-356-3227	1	Spool, Printing, Ribbon 10900, 82423	1-14					1,2,3
5815-00-224-9717	1	Tuning Fork SC-D-70237	1-14					1,2,3

b. Teletypewriters TT-335/TG and TT-537/G.

NSN	Qty	Nomenclature, part No. and mfg code	Fig. No.	Dimensions (in.) Height	Depth	Width	Weight (lb)	Usable on code
5815-00-878-8449		Teletypewriter TT-335/TG		11-1/8	17-3/8	20-1/4		
5815-00-926-7378		Teletypewriter TT-537/G consisting of:		11-1/8	17-3/8	20-1/4		
		NOTE The part number is followed by the applicable 5-digit Federal supply code for manufacturers (FSCM) identified in SB 708-42 and used to identify manufacturer, distributor, or Government agency, etc. In usable on code column the numeral 1 refers to TT-335/TG and the numeral 2 refers to TT-537/G.						
	1	Teletypewriter TT-335/TG (Basic Component)						
	1	Teletypewriter TT-537/G (Basic Component)	1-8					
5995-00-089-4251	1	Cable Assembly, (Line) Special Purpose, Electrical 51908A, 82423	1-6					2
5815-00-682-8785	1	Cover, Teletypewriter, 57730A, 82423	1-11					1,2
3020-00-892-4574	1	Gear, Worm, 64864 (60 wpm), 82423	1-14					1,2
3020-00-892-4573	1	Gear, Worm, 64933 (100 wpm), 82423	1-10					1,2
3020-00-892-4572	1	Gear, Spur 64862A (60 wpm), 82423	1-14					1,2
3020-00-892-4571	1	Gear, Spur 64932A (100 wpm), 82423	1-10					1,2
7530-00-223-7966	1	Paper, Recording, Teletypewriter, UU-P-547C	1-4					1,2
7510-00-082-2648	1	Ribbon, Printing, Teletypewriter, 10901, 82423	1-4					1,2
5815-00-356-3371	1	Shaft Assembly SC-B-70404	1-14					1,2
5815-00-356-3227	1	Spool, Printing, Ribbon, 10900, 82423	1-14					1,2

c. Teletypewriter Sets AN/PGC-3, TT-698/TG, TT-698A/TG and TT-698B/TG.

NSN	Qty	Nomenclature, part No. and mfg code	Fig. No.	Dimensions (in.) Height	Depth	Width	Weight (lb)	Usable on code
5815-01-012-8773	1	Teletypewriter, Set AN/PGC-3 consisting of:						
		NOTE In Usable On Code Column, the numeral 1 refers to the TT-698/TG; numeral 2 refers to the TT-698A/TG; numeral 3 refers to the TT-698B/TG.						
	1	Teletypewriter TT-698/TG (Basic Component)	1-7	11-1/4	18-7/8	22-1/2	44	
	1	Teletypewriter TT-698A/TG (Basic Component)	1-7	11-1/4	18-7/8	22-1/2	44	
	1	Teletypewriter TT-698B/TG (Basic Component)	1-7	11-1/4	18-7/8	22-1/2	44	
	1	Cover, Teletypewriter, 51490A 82423	1-11	10-1/2	18	21	5-1/4	1
5815-00-682-8785	1	Cover, Teletypewriter, 57730A, 82423	1-11	10-1/2	18	21	5-1/2	2,3
3020-00-203-1327	1	Gear, Worm SC-B-70482 (100 wpm)	1-10					1,2,3
3020-00-203-1678	1	Gear, Worm SC-B-69681 (60 wpm)	1-14					1,2,3

NSN	Qty	Nomenclature, part No. and mfg code	Fig. No.	Dimensions (in.)			Weight (lb)	Usable on code
				Height	Depth	Width		
5815-00-351-7944	1	Gear, Spur SC-B-70478 (100 wpm)	1-10					1,2,3
	1	Gear, Spur SC-B-70492 (60 wpm)	1-14					1,2,3
7530-00-223-7966	1	Paper, Recording, Teletypewriter W-P-547C	1-4	4-1/2 Dia roll		8-1/2	3	1,2,3
7510-00-082-2648	1	Ribbon Printing, Teletypewriter 10901, 82423	1-4					1,2,3
5815-00-356-3371	1	Shaft Assembly 50605A, 82423	1-14					1,2,3
5815-00-356-3227	1	Spool, Printing, Ribbon 10900, 82423	1-14					1,2,3
5815-00-224-9717	1	Tuning Fork SC-D-79237	1-14					1,2,3

NOTE

National Stock Numbers (NSN) not listed in the above chart were not available at the time of printing of this publication. Upon assignment, they will be included in the next change to this manual.

1-10. Expendable Consumable Supplies and Materials

Expendable Consumable Supplies and Materials are listed in table 1-1.

Table 1-1. Expendable Consumable Supplies and Materials

The supplies and materials listed in this table are required for operation of this equipment and are authorized to be requisitioned by SB 700-50. The NSN for the applicable unit of issue required can be found in appropriate supply catalogs. The FSCM is used as an element in item identification to designate manufacturer or distributor or Government agency, etc., and is identified in SB 708-42.

NSN	*Item*	*Use*	*Requisitioning Data*
7530-00-223-7966	Paper, recording, Teletypewriter[a]	Record messages	Fed. Spec. W-P-547C, type 1, class A
7510-00-082-2648	Ribbon, printing, teletypewriter[b]	Records message on paper	Kleinschmidt part No. 10901
5920-00-296-0451	Fuse FO2A250V 1/8 amp.[c]	Protects line circuit	MIL-F-15160/02
5920-00-131-9819	Fuse 1.6 amp. 125 volt[d]	Protects motor	Littlefuse #31301.6
5920-00-581-4144	Fuse, cartridge, 2 amp.[e]	Protects motor	Bussman Part No. MDXZ
5920-00-642-9009	Fuse, cartridge, 3 amp. FO2D3R00B[f]	Protects heater	MIL-F-15160, Part No. MS90078
6240-00-892-6102	Lamp, 120V. 10W. double contact, bayonet candelabra base.[g]	Copy lamp	G.E. #10C7/5DC
TM 11-5815-206-12	Technical manual[h]	Operator's and organizational maintenance	Publications request

[a] 2 ea. rolls furnished with equipment.
[b] 2 ea. furnished with equipment.
[c] 7 ea. furnished with TT-4(*)/TG, TT-335/TG, TT-537/G and TT-698(*)/TG (1 mounted, 6 spare).
[d] 7 ea. furnished with TT-4(*)/TG and TT-698(*)/TG (1 mounted 6 spare).
[e] 7 ea. furnished with TT-335/TG and TT-537/G (1 mounted, 6 spare).
[f] 6 ea. furnished with TT-335/TG and TT-537/G (1 mounted, 5 spare).
[g] 2 ea. furnished with TT-4(*)/TG, TT-335/TG, TT-537/G and TT-698(*)/TG (1 mounted, 1 spare).
[h] 1 ea. furnished with TT-4(*)/TG, TT-335/TG, TT-537/G and TT-698(*)TG.

1-11. Common Names

Item	*Common name*
Teletypewriter Set AN/PGC-1 and AN/PGC-3	Teletypewriter set
Teletypewriter TT-4A/TG, TT-4B/TG, TT-4C/TG, TT-335/TG, TT-537/G, TT-698/TG, TT-698A/TG and TT-698B/TG	Teletypewriter
Cases CY-694/PGC-1 and CY-694A/PGC-1	Case

1-12. Description

The teletypewriter set consists of a lightweight teletypewriter (fig. 1-1) and a canvas bag which contains three cable assemblies (fig. 1-5. Only the power cable is furnished with the TT-698(*)/FG.

a. The teletypewriter includes a send-receive teletypewriter (fig. 1-7), a wooden transportation and storage case (fig. 1-1), a dust cover (fig. 1-7), an immersionproof cover (fig. 1-11), a set of running spares (fig. 1-4), a tuning fork, mounted within the dust cover, and an accessory worm and worm gear (fig. 1-6). The teletypewriter base includes hooks for lashing the teletypewriter to a packboard for manual transport (fig. 1-11 and 1-12). The immersionproof cover is held to the teletypewriter base with spring-loaded clamps. The dust cover includes a window, copyholder, operating instruction panel, and hinged doors (fig. 1-7).

b. The major mechanical subdivisions of the teletypewriter include the keyboard transmitter (fig. 1-9), type-bar carriage, platen assembly, selector mechanism, paper storage assembly (fig. 1-10), the motor and accessory gears, all secured to the main frame assembly of the teletypewriter. A line terminal board and a control panel are mounted on the left-front corner of the teletypewriter under the dust cover (fig. 1-9).

1-13. Differences in Models

a. Teletypewriters TT-4(*)/TG and TT-698(*)/TG are high level and low level signaling units, respectively; they are identical operationally, except that the TT-698(*)/TG operates from an ac source only whereas the TT-4(*)/TG will operate from either an ac or dc source. The only physical difference of significance to the operator are:

(1) The key tops of the TT-4A/TG and TT-698/TG are round (fig. 1-9); the key tops of all other models are square (fig. 2-5).

(2) The dust cover of the TT-4A/TG and TT-698/TG is held to the base with springs and dust cover mounting studs (fig. 1-11); the dust covers of all other models are held to the base with a C-shaped cam lock on each side of the cover.

(3) All models, except the TT-4A/TG and TT-698/TG, include a blocking plate (fig. 2-2), which is used to prevent movement of the carriage-return driving gear during shipment. The blocking plate is not included with the TT-4A/TG and TT-698/TG.

(4) The location of that portion of the ribbon sensing level that must be operated manually when removing and replacing the inking ribbon is as follows:

(*a*) On all models, except the TT-4A/TG and TT-698/TG, it is located toward the center of the type-bar carriage, below its associated ribbon cup (fig. 3-5).

(*b*) On the TT-4A/TG and TT-698/TG, it is located toward the outer side of the type-bar carriage, below its associated ribbon cup (fig. 1-9).

(5) The TT-537/G is provided with platen and carriage locks which can be applied and released without removing the dust cover, as shown in figures 2-3 and 2-4.

(6) The TT-537/G is equipped with automatic carriage return and line feed which returns the carriage to the left margin of the unit, and provides a single and/or double line feed to prevent overprinting when the end of the line is reached.

(7) On the TT-537/G, the power cable is permanently wired to the teletypewriter. When the unit is packed to be transported, the power cable is wound around the dust cover and the connector is clamped to the clamping device on the left front of the dust cover before the immersionproof cover is installed (fig. 1-8). The line cable is shipped loose in a bag (fig. 1-6), and it is plug-connected, through a hole in the dust cover, to the teletypewriter line jack (fig. 1-8). Under emergency conditions, the signal lines can be connected directly to terminals 3 and 4 (term. 3 negative) of the line terminal board (A, fig. 2-6).

(8) The TT-537/G is designed for operation on conventional 120- to 130-volt dc signal circuits or for the reception of 6-volt signals. The TT-537/G includes a solid-state amplification system which increases the low-level signals (6 volts) to the higher voltage required to operate the selector magnet.

(9) The TT-335/TG and the TT-537/G are equipped with casting heaters which maintain the equipment at operating temperatures in extremely cold weather. The heaters are electrically operated and are controlled by the operation of a three-position LIGHT-HEATER switch (B, fig. 3-1); an additional fuse protects the heater circuit. The TT-4(*)/TG includes a two-position LIGHT switch (A, fig. 3-1).

(10) The motors of the TT-335/TG and TT-537/G are designed for operation with 108- to 132-volt, 396- to 404-cps alternating current.

(11) The paper storage assembly of the TT-537/G is equipped with retaining levers instead of retaining springs to assure positive retention of the paper roll during transport (fig. 3-4).

(12) The TT-4(*)/TG power cable assembly includes a two-pin connector. The TT-335/TG power cable assembly includes a three-pin, twist-lock connector. Th TT-537/G power cable assembly includes a five-pin connector.

(13) The TT-698(*)/TG teletypewriters operate on a line current of less than 100 microamperes. Additionally, the high level interface operation, motor stop function, and dc source input are not included in the TT-698(*)/TG teletypewriters.

(14) Cases CY-694/PGC-1 and CY-694A/PGC-1 are identical except that the CY-694A/PGC-1 includes straps and two wooden troughs for securing two rolls of recording paper to the lid of the case (fig. 2-12 and 2-1), instead of one roll as with the Cy-694/PGC-1.

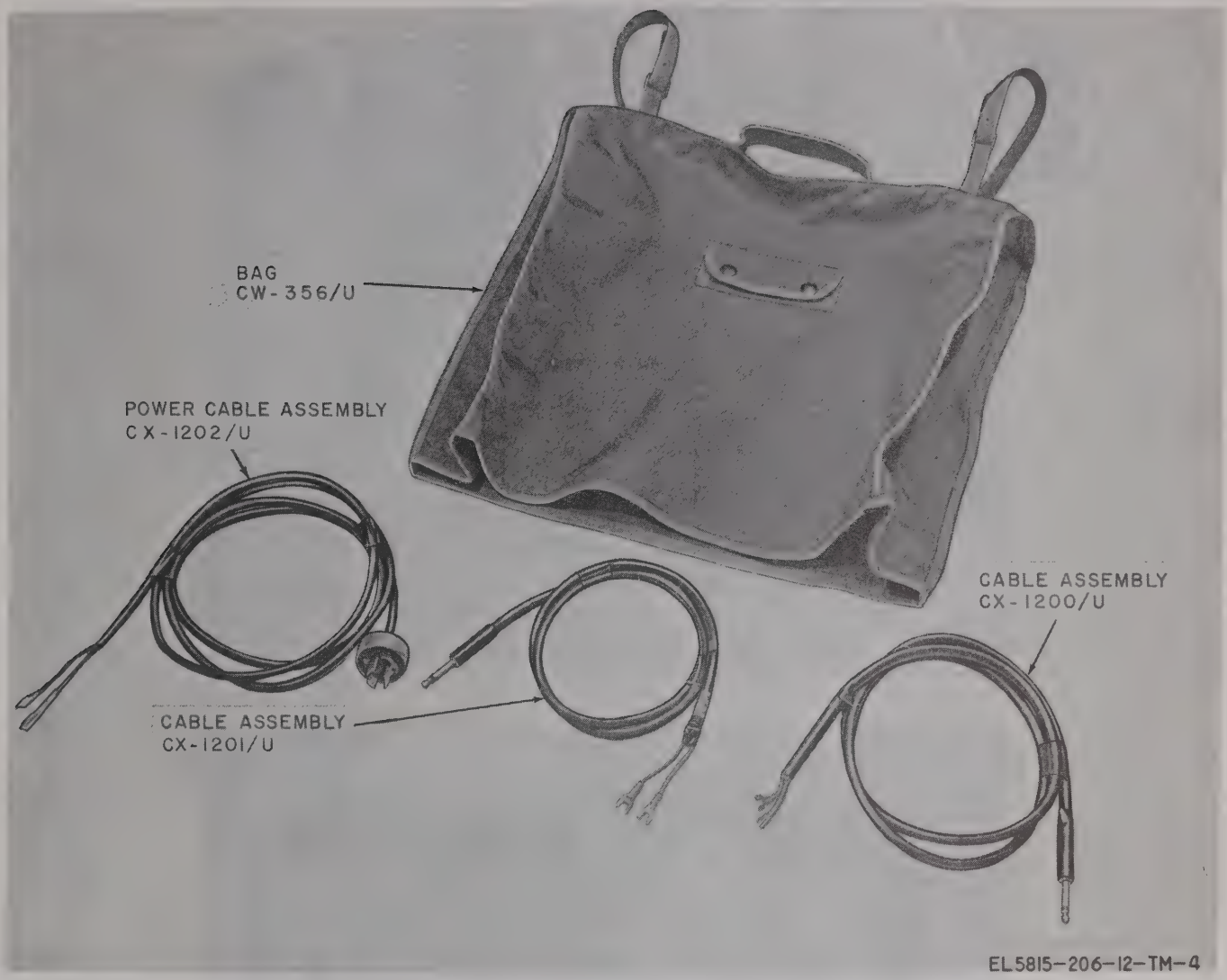


Figure 1-5. Bag CW-356/U and cable assemblies (TT-4(*)/TG and TT-335/TG).

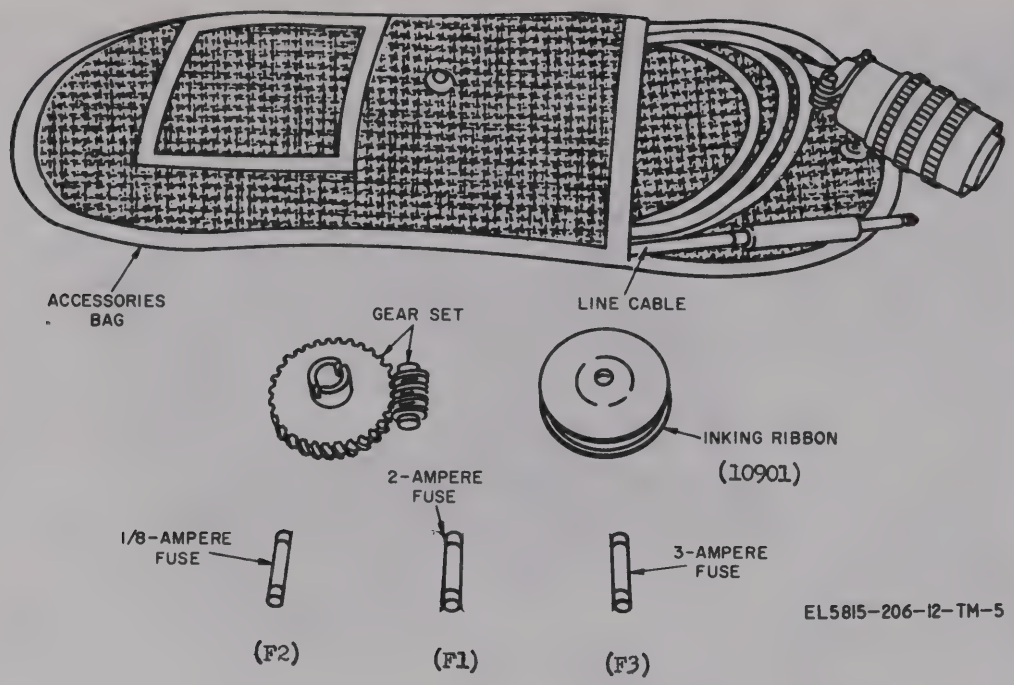


Figure 1-6. Accessories bag and contents (TT-537/G).

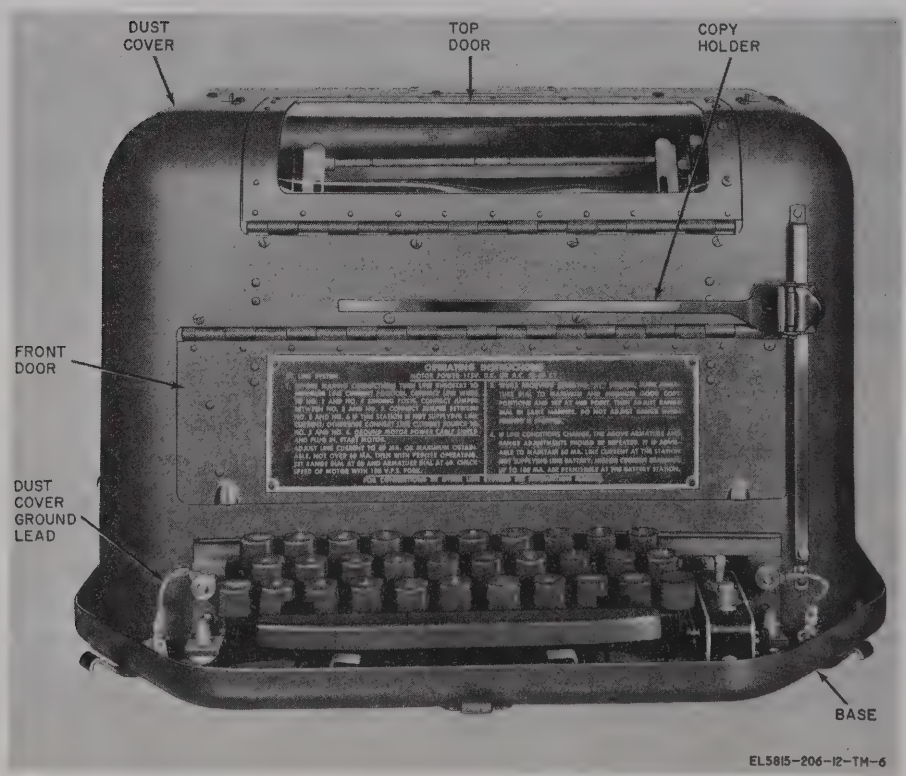


Figure 1-7. Teletypewriter TT-4(*)/TG or TT-698(*)/TG, dust cover installed, front cover.

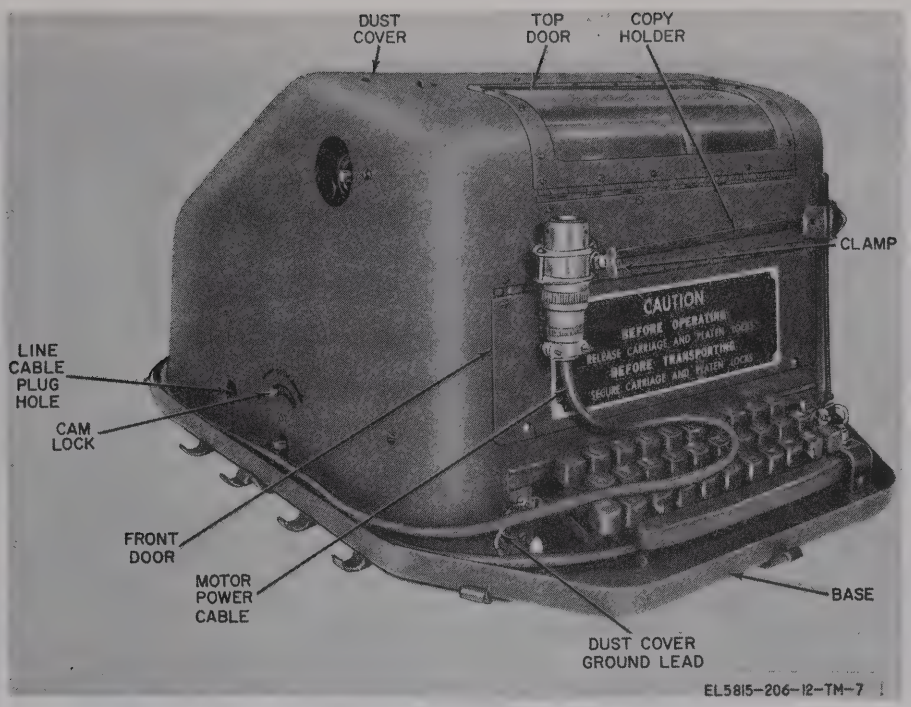


Figure 1-8. Teletypewriter TT-537/G, dust cover installed, left front view.

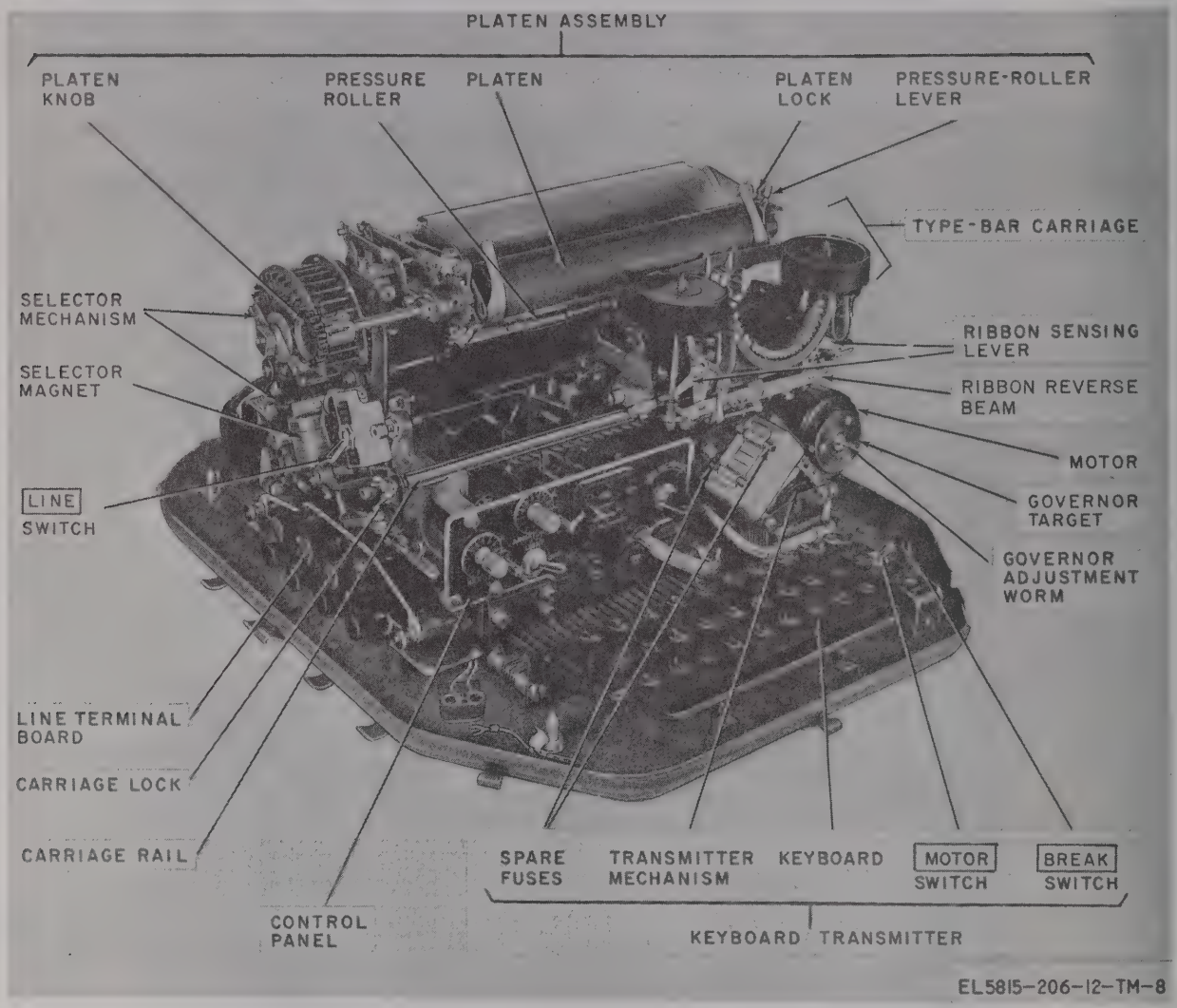


Figure 1-9. Teletypewriter TT-4(*)/TG, dust cover removed, front-left-side view.

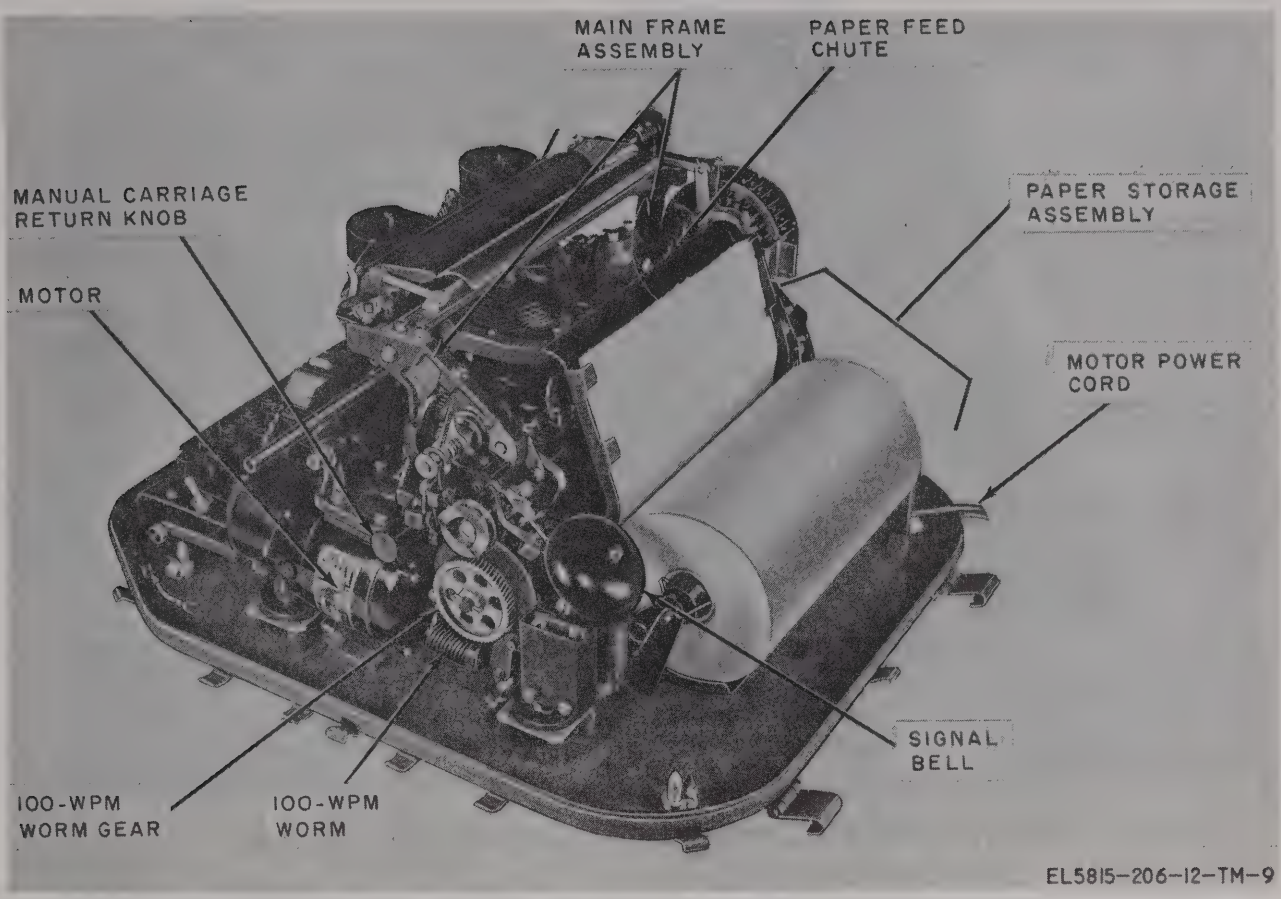


Figure 1-10. Teletypewriter TT-4(*)/TG, dust cover removed, rear-right-side view.

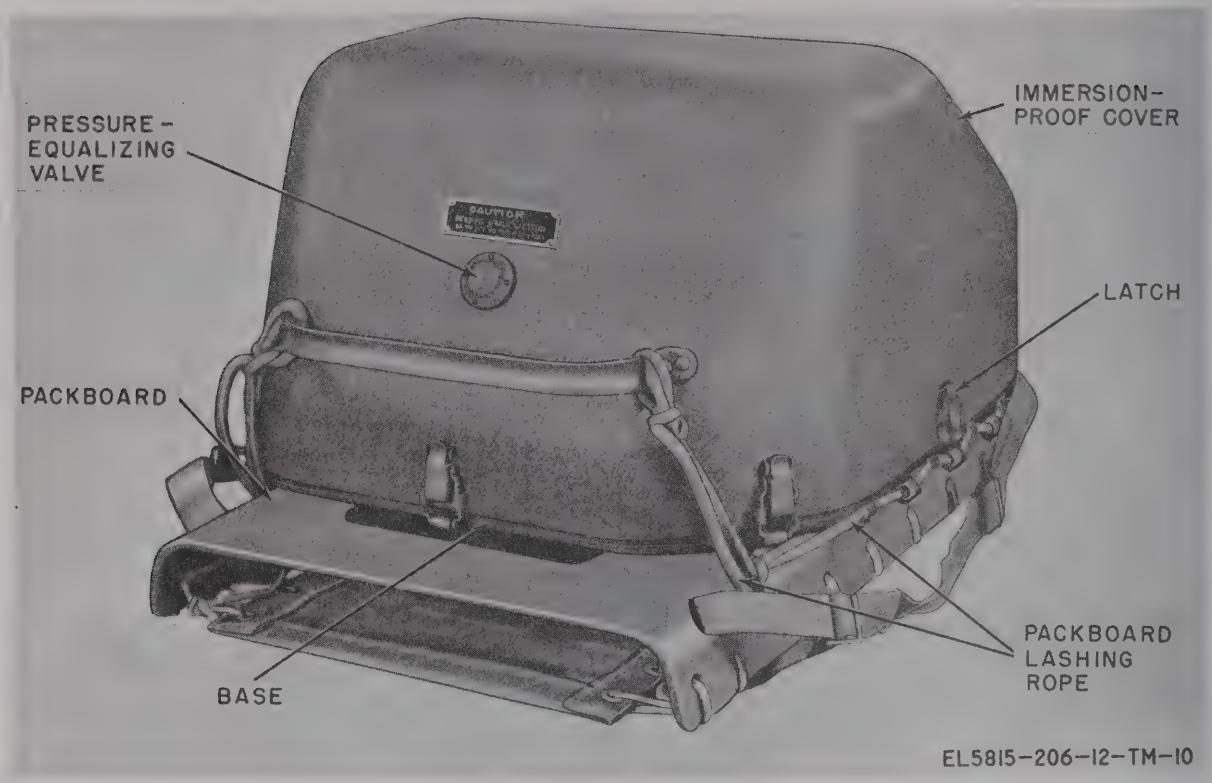


Figure 1-11. Teletypewriter TT-4(*)/TG, or TT-698(*)/TG lashed to packboard.

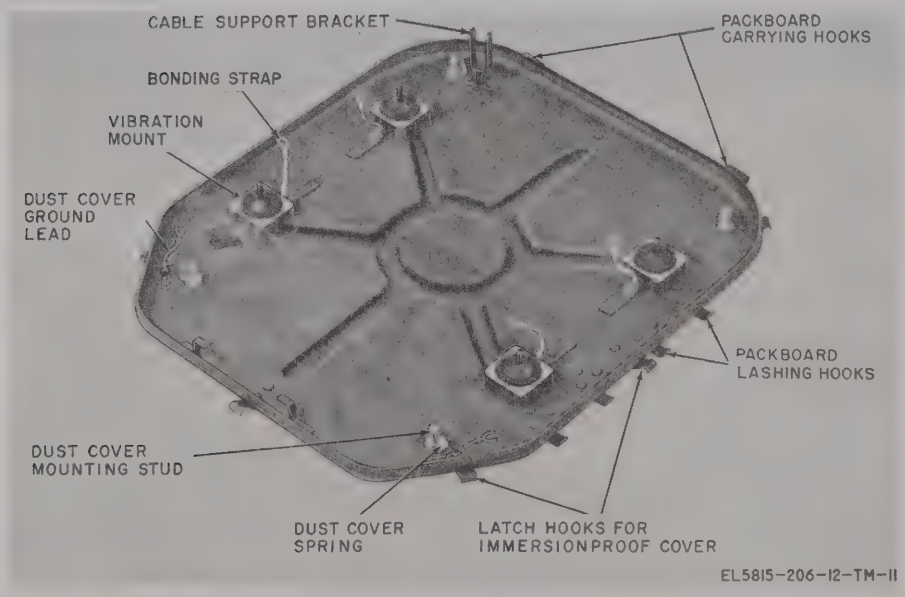


Figure 1-12. Base of Teletypewriter TT-4(*)/TG or TT-698(*)/TG.

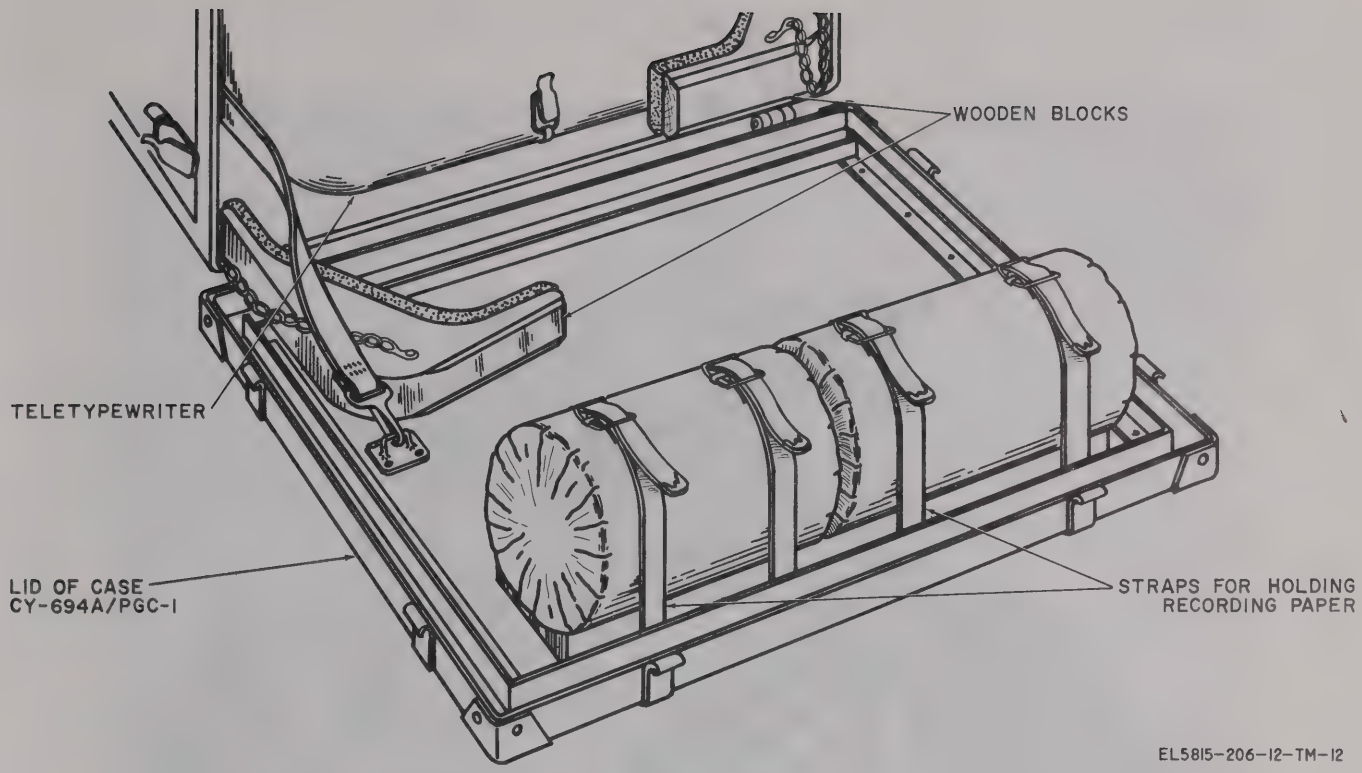
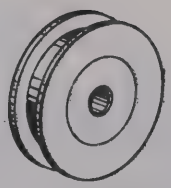
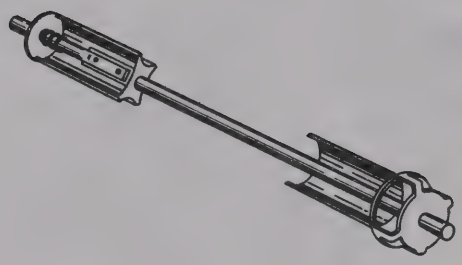


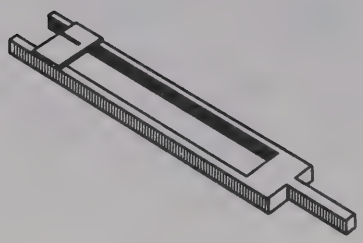
Figure 1-13. Method of securing recording paper to lid of Case CY-694A/PGC-1.



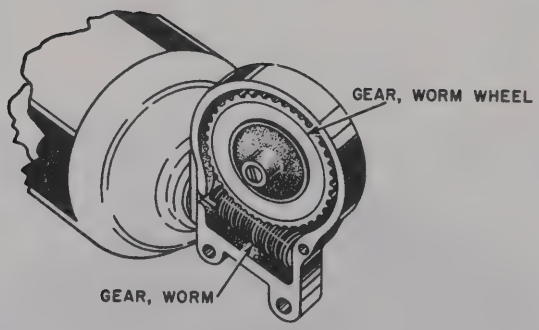
A. SPOOL



B. SHAFT ASSEMBLY



C. TUNING FORK



D. 60-WPM GEARS

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Figure 1-14. Components.

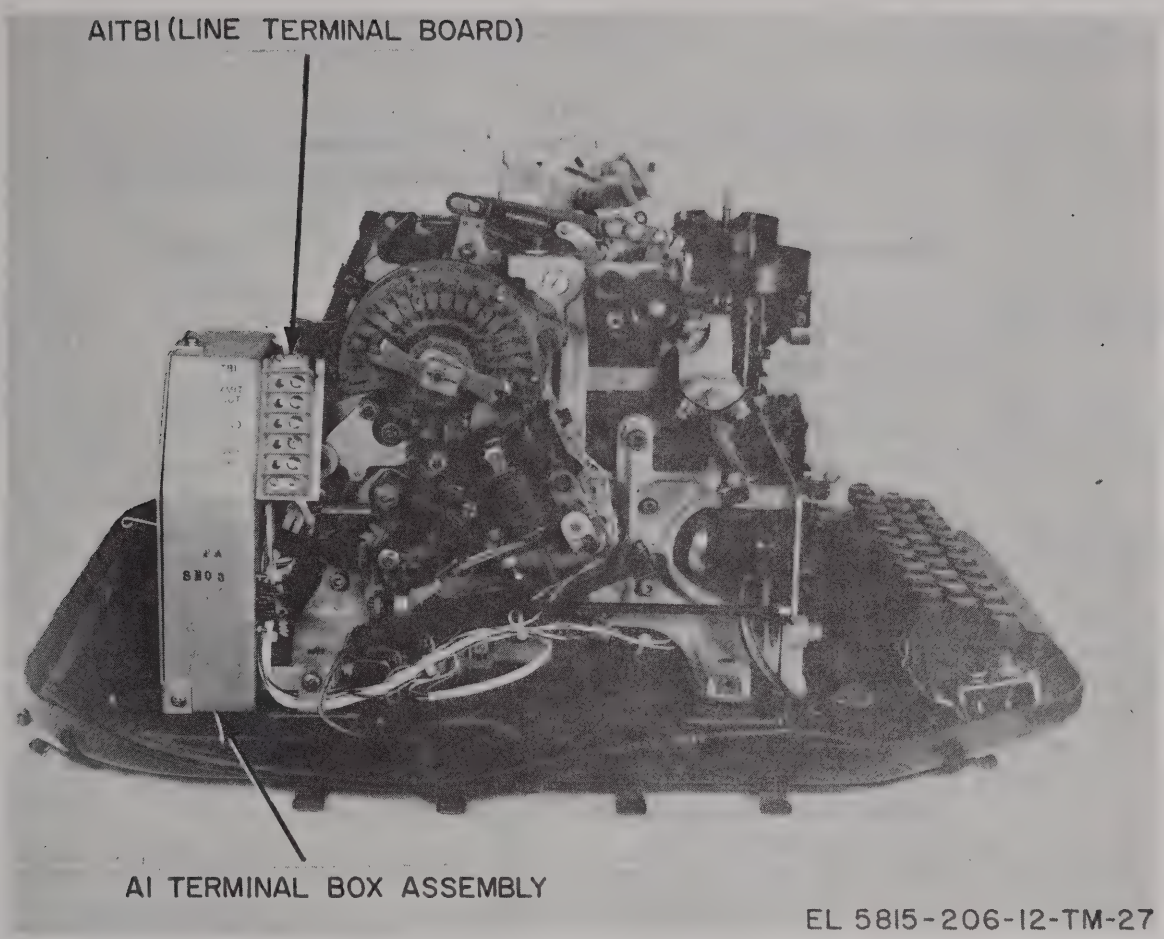


Figure 1-15. Teletypewriter TT-698(*)/TG, dust cover removed, left side view.

CHAPTER 2

INSTALLATION

NOTE

The procedures described in this chapter should be performed by qualified teletypewriter maintenance personnel.

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

2-1. Unpacking

(fig. 2-1)

a. Packaging Data. The factory packaging arrangement of the teletypewriter set is suitable for either export or domestic shipment. The wooden box is 20½ inches high, 26¼ inches wide, and 26¼ inches deep. The volume of the wooden box is 9.5 cubic feet and the total weight of the packaged set is approximately 200 pounds. When only Teletypewriter TT-4(*)/TG, TT-335/TG, or TT-698(*)/TG is furnished, packaging is the same, except that Bag CW-356/U and the three cable assemblies (para 5*a*) are not included. When the TT-537/G is furnished, the wooden box is replaced with a triple-wall fiberboard carton and the accessories bag (fig. 1-6) with the line cable assembly is included.

b. Removing Contents.

(1) Cut the steel straps with a pair of tin snips or other appropriate tool.

(2) Remove the nails from the wooden box lid and remove the lid of all models, except the TT-537/G. On the TT-537/G, cut the tape and open the triple-wall fiberboard carton.

(3) Carefully turn the wooden box or triple-wall carton until the opening is down and lift the wooden box or triple-wall carton from the fiberboard carton.

(4) Carefully cut open one end of the fiberboard carton and remove the Case CY-694(*)/PGC-1.

(5) If the equipment consists of the complete teletypewriter set, remove the technical manuals and accessories bag from the case. If only the TT-4(*)/TG, TT-335/TG, or TT-698/TG, is furnished, remove the technical manuals and the spare parts package. For the TT-537/G, remove the technical manuals and accessories bag.

(6) Unfasten the six latches on the top of the case, tilt the lid upward, and remove the teletypewriter.

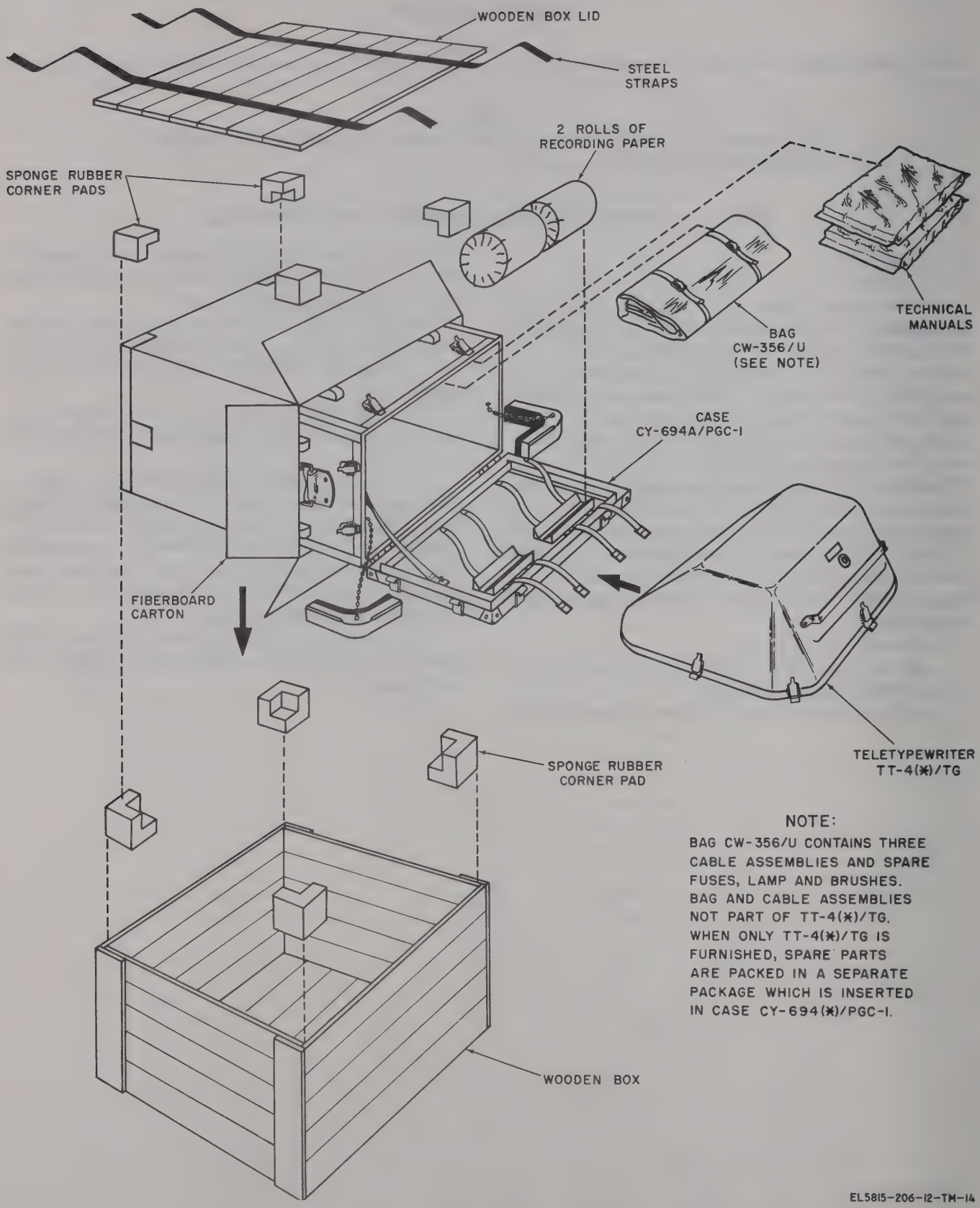

WOODEN BOX LID
STEEL STRAPS
2 ROLLS OF RECORDING PAPER
SPONGE RUBBER CORNER PADS
TECHNICAL MANUALS
BAG CW-356/U (SEE NOTE)
CASE CY-694A/PGC-1
FIBERBOARD CARTON
TELETYPEWRITER TT-4(*)/TG
SPONGE RUBBER CORNER PAD
NOTE:
BAG CW-356/U CONTAINS THREE CABLE ASSEMBLIES AND SPARE FUSES, LAMP AND BRUSHES. BAG AND CABLE ASSEMBLIES NOT PART OF TT-4(*)/TG. WHEN ONLY TT-4(*)/TG IS FURNISHED, SPARE PARTS ARE PACKED IN A SEPARATE PACKAGE WHICH IS INSERTED IN CASE CY-694(*)/PGC-1.
WOODEN BOX
EL5815-206-12-TM-14

Figure 2-1. Method of packing teletypewriter set for export or domestic shipment.

2-2. Checking Unpacked Equipment

A complete Teletypewriter Set AN/PGC-1, or AN/PGC-3, and Teletypewriters TT-4(*)/TG, TT-335/TG, TT-537/G, or TT-698(*)/TG consists of the items listed in paragraph 1-9 and 1-10, and Appendix B as applicable. Check the equipment received against the packing list. If a packing list was not received, check for the presence of all applicable items listed in paragraphs 1-9, 1-10, and appendix B. Remove the remaining shipping materials and check the teletypewriter (a through *b* below). If the equipment has been damaged, or if it is incomplete, refer to paragraph 1-3.

a. Unfasten the eight spring-loaded latches that hold the immersionproof cover to the teletypewriter base. Press the center of the pressure-equalizing valve (fig. 1-11) to equalize the internal and external pressure. Lift the cover from the base.

b. Loosen the round knurled nuts and disconnect the dust cover ground leads from the front corners of the dust cover (fig. 1-7).

c. Push the platen knob (fig. 1-9) inward until it is inside the dust cover.

d. For the TT-4A/TG or TT-698/TG, grasp the rear corners of the dust cover, raise the rear of the dust cover to free it from the rear mounting posts, and lift it straight upward. Release the motor power cable connector from the dust cover of the TT-537/G (fig. 1-8). For all models, except the TT-4A/TG or TT-698/TG, turn the cam-lock assembly on each side of the dust cover and lift the cover straight upward.

e. Pivot the front access door upward and remove the tuning fork from the brackets on the inner side of the door. Remove the protective wrapping from the tuning fork, examine the fork for damage, and replace it in its brackets.

f. Remove the wooden blocks that have been used to prevent damage to the equipment during shipment. Check carefully to be sure that all blocks are removed.

g. Remove the tape from the following places:

(1) Signal-bell clapper at rear right-hand corner of teletypewriter.

(2) LTRS key lever and space bar on keyboard.

(3) Type basket above control panel.

(4) Motor power cord beneath paper-feed chute at rear of the teletypewriter. (Not applicable to TT-537/G.)

h. Wipe all shipping material particles from the teletypewriter with a clean cloth.

2-3. Siting

Select an installation site that meets the following requirements:

a. Shelter. The teletypewriter must be operated in a shelter in which the temperature is kept warm enough to permit finger operation of the teletypewriter keys. A tent or a canvas-covered truck is adequate, but a heated building or closed truck is preferable as an operating site. Shelter requirements normally do not present any problems when the equipment is to be operated on shipboard or in aircraft.

b. Space. Each teletypewriter operating position requires a floor space area of approximately 3 feet by 5 feet.

TT-335 TG and TT-537 G are equipped with heaters which permit operation in extreme cold. Use of the TT-537 G normally does not include operation of the keyboard-transmitter, therefore finger operation temperature is not required.

c. Power. The TT-4(*) TG requires a source of 105- to 125-volt dc or ac (50- or 60-Hz single-phase) for the teletypewriter motor. The TT-335 TG and TT-537 G require 105- to 125-volt, 396- to 404-cps, single-phase alternating current for the teletypewriter motor and for the amplifier circuits of the TT-537 G. The TT-537 G may also be operated from a 396- to 404-cps, three-phase. Y-connected generator with the motor and electronics powered from one phase and the heaters from the second phase, if the phase-to-neutral voltage is between 105 to 125 volts. The TT-537 G will operate on a nominal signal line voltage range of 6 ($\pm$1) volts and 120-130 volts dc. The TT-698(*)/TG requires a source of 105 to 125 volts ac (50- or 60- Hz, single-phase) for the teletypewriter motor and electronic modules.

d. Lighting. Adequate lighting must be available for both day and night operation.

e. Ground Connection. A suitable ground connection point must be available to provide adequate protective grounding, as described in paragraph 2-7*b*.

Section II. PRELIMINARY INSTALLATION PROCEDURE

2-4. Tools, Test Equipment, and Materials

The following tools, test equipments, and materials are required for installation of the teletypewriter set, but are not furnished as part of the set.

a. Tool Equipment TE-50-B.

b. Multimeter TS-352/U, or equivalent.

c. Oil, lubricating, general purpose, NSN 9150-00-223-4129.

2-5. General

a. Positioning Teletypewriter. Set the teletypewriter on a table or any raised, flat surface high enough for convenient operation of the keyboard, preferable a surface that permits knee space for the operator. If no suitable table or other operating surface is available, set the teletypewriter on its case (fig. 1-1). When the teletypewriter is transported to the installation site by packboard (fig. 1-1) and the case is not available, remove the immersionproof cover, lash the teletypewriter to the packboard, and set the packboard on any suitable supporting surface.

b. Installing Recording Paper and Inking Ribbon. Install a roll of recording paper (para 3-5) and a spool of inking ribbon (para 3-6).

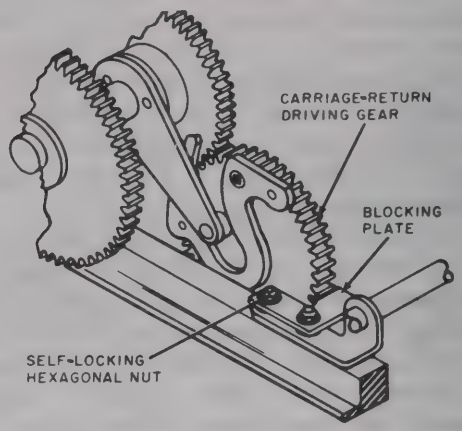
c. Checing Fuses. See that a good 1/8-ampere fuse is in the LINE FUSE holder, as shown in figure 3-1. The MOTOR FUSE fuseholder of the TT-4(*)/TG and TT-698(*)/TG requires a good 1.6-ampere fuse. The HTR FUSE fuseholder of the TT-335/TG and TT-537/TG requires a good 3-ampere fuse. See that a good spare line fuse and motor fuse are installed in the spare-fuse clip on the cover of the transmitter mechanism (fig. 1-9).

2-6. Unlocking Locking Devices

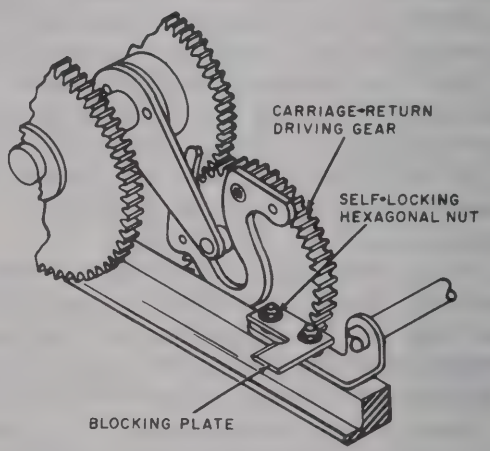
a. Blocking Plate. A blocking plate is provided (on all models except TT-4A/TG and TT-698/TG) to lock the carriage-return driving gear firmly in place during shipment. Remove the two self-locking hexagonal nuts, set the blocking plate to the position shown in B, figure 2-2, and replace the nuts.

b. Platen Lock (TT-4(*)/TG, TT-335/TG, and TT-698(*)/TG (fig. 1-9). The platen lock is used to lock the platen during transportation of the teletypewriter. To unfasten the platen lock, loosen the wingnut at the right-hand end of the platen, turn the locking lever counterclockwise until it clears the movable parts of the platen assembly, and tighten the wingnut.

c. Platen Lock (TT-537/G) (fig. 2-3). The platen lock is used to lock the platen in the letters-shift position during transporation of the teletyprewriter. To unlatch the platen, open the access window of the dust cover, release the figure shift crank, and move the platen lock lever to the right to release the platen. Close the access window.



A. BLOCKING PLATE IN SHIPPING POSITION



B. BLOCKING PLATE POSITIONED FOR TELETYPEWRITER OPERATION

EL5815-206-12-TM-15

Figure 2-2. Blocking plate arrangements (all models except TT-4A/TG and TT-698/TG).

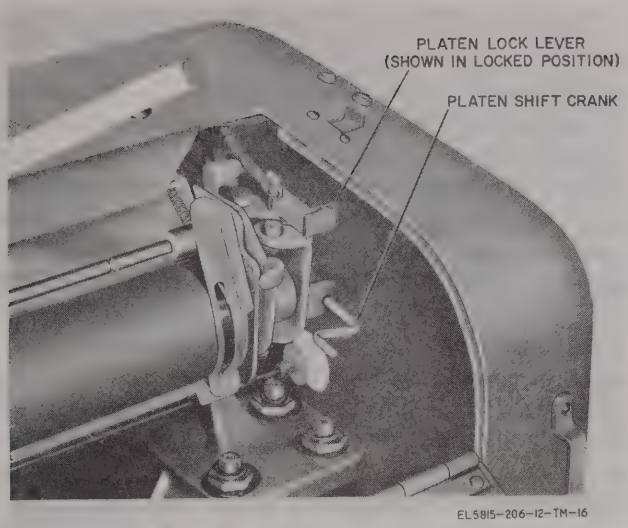


Figure 2-3. Platen lock (TT-537/G).

d. Carriage Lock, (TT-4(*)/TG, TT-335/TG and TT-698(*)/TG (fig. 1-9). The carriage lock is used to lock the type-bar carriage in the extreme left-hand position during transporation. To unfasten the carriage lock, loosen the wingnut on the left-hand end of the carriage rail, turn the lock until it hangs downward from the rail, and tighten the wingnut.

e. Carriage Lock (TT-537/G) (fig. 2-4). The carriage lock is used to lock the type bar carriage in the extreme left-hand position during transportation. To unfasten the carriage lock, open the access window and reach under the left side of the access opening to disengage the carriage lock. Push the carriage lock lever ot the rear to unlock the carriage. Close the access window.

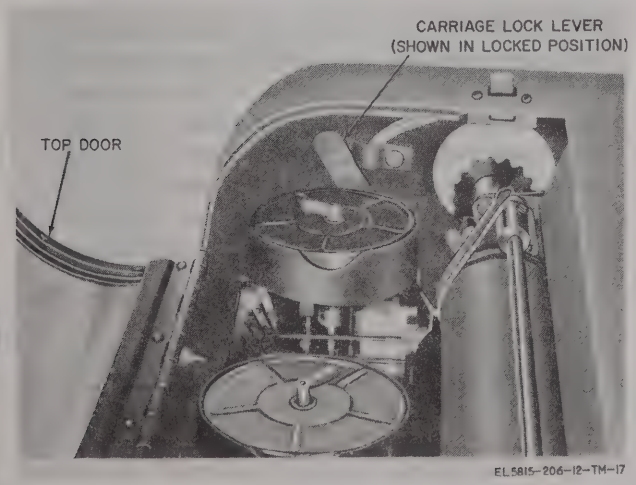


Figure 2-4. Carriage lock (TT-537/G).

f. Keyboard Lock. If messages are to be transmitted from the teletypewriter, loosen the locknut (fig. 2-5), slide the keyboard lock toward the front of the teletypewriter, and tighten the locknut.

2-7. Motor Power and Protective Ground Connections

a. Motor Power Connection. Connect the TT-4(*)/TG motor power cord (fig. 1-10) to a source of 105- to 125-volt dc or ac (50- to 60-Hz single-phase) power. Connect the motor power cord of the TT-335/TG to a source of 108- to 132-volt, 396- to 404-cps, single phase, ac power. Connect the motor power cable (fig. 1-7) of the TT-537/G to the mating connector on the computer (source of 105- to 125-volt, 396- to 404-cps, single-phase, ac power (para 2-3*c*). Connect the power cord of the TT-698(*)/TG (fig. 1-10) to a source of 105- to 125-volt ac (50- to 60Hz, single-phase) power.

b. Protective Ground Connection. Connect the braided metal pigtail on the plug of the motor power cord to a suitable ground connection point ((1) and (2) below).

(1) When installing the teletypewriter in an aircraft or on a vessel, connect the pigtail to a metal structural member of the aircraft or vessel.

(2) If the teletypewriter is to be installed at a ground communication site, connect the pigtail to a water pipe or other similar low-resistance ground (5 or 6 feet ground rod). Use a length of field wire or any available wire of equal or heavier gage. If a suitable ground connection point is not available, use one or more ground rods to obtain a low-resistance ground connection point. The ground rod (or rods) may be located as far as 1,000 yards from the teletypewriter. Select a low, damp site, preferably a spot whre the soil is clay or loamy.

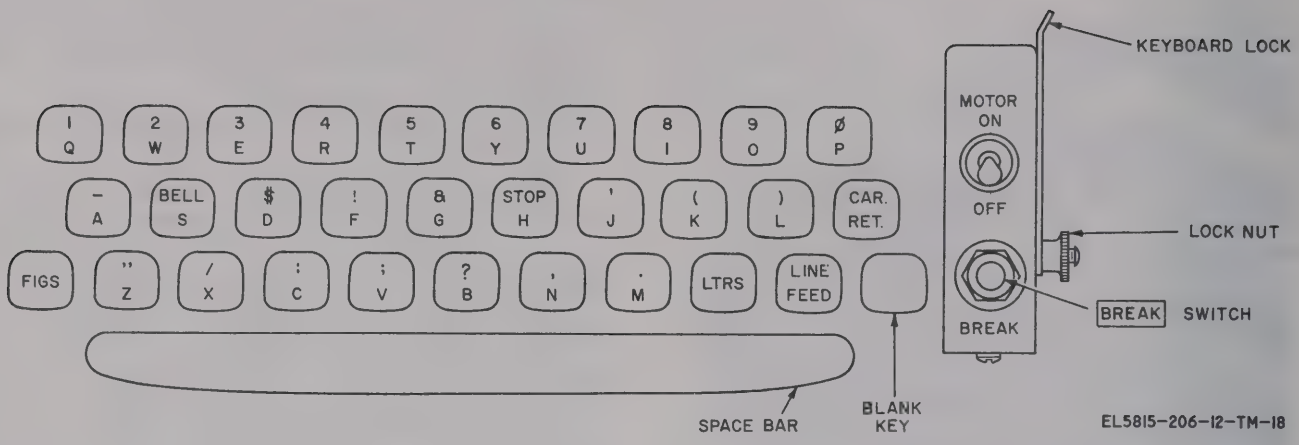


Figure 2-5. Teletypewriter TT-4(*)/TG or TT-698(*)/TG.

(*a*) Scoop out a hole about 6 inches in diameter and about 6 inches deep.

(*b*) Drive a rod vertically into the hole until the top of the rod is approximately 3 inches below the surface of the earth. Swing the driving hammer carefully to avoid whipping of rod (whipping results in poor contact between the rod and the soil).

(*c*) Connect one end of a ground lead to the ground rod. Be sure to obtain a good bond between the rod and the lead. Connect the other end of the lead to the pigtail on the plug of the motor power cord.

(*d*) Saturate the earth around the top of the rod with water, fill the hole around the rod with earth, and add more water.

(*e*) If the soil in the area normally is not moist, drive another ground rod approximately 15 feet from the first rod and connect it to the first rod. If the soil is exceptionally dry, drive several additional rods to form two rows of rods with a minimum of ten feet between the rows and connect the rows in parallel. Add water occasionally (daily, if necessary) to maintain good contact between the ground rods and the soil.

2-8. Adjusting Motor Speed (Not Applicable on TT-335/TG and TT-537/G)

a. Remove the tuning fork from the clips on the rear of the front door on the dust cover.

b. Turn the MOTOR switch to ON (fig. 1-8). Allow the motor to run for several minutes.

c. Strike the tuning fork *gently* against the hand to set it into vibration.

d. Hold the vibrating end of the tuning fork close to one eye and look through the slots in the vibrating shutter to view one of the white dots on the governor target (fig. 1-9).

e. Make no adjustment if the selected spot appears to be motionless. If the spot appears to be moving clockwise, pull the end of the governor adjustment worm outward. Release the worm when the apparent clockwise motion of the spot has stopped. If the spot appears to be moving counterclockwise, push the end of the governor adjustment worm inward until the apparent counterclockwise motion of the spot has stopped. To avoid overadjustment, release the worm just before the spot appears to come to a halt.

f. Replace the tuning fork in its storage clips on the rear of the front door. Be sure to insert the fork between the clips and the springs. Do not insert the fork between the springs and the door.

NOTE

The motor speed adjustment procedure is the same for all operating speeds of the teletypewriter, as described in paragraph 1-4*c*. If the teletypewriter is to be operated at a speed other than 60 wpm, the appropriate worm and worm gear must be installed. This procedure is beyond the scope of the operator's duties and must be performed by higher category maintenance personnel.

Section III. FINAL INSTALLATION PROCEDURE

2-9. Installation Options

a. Installation for Half-Duplex Operation Not Applicable to TT-698(*)/FG, (para 2-11 and 2-12). When installed for half-duplex operation, a teletypewriter is connected to one or more other teletypewriters and all can send messages to and receive messages from each other (not simultaneously). The transmitted messages are printed at all teletypewriters, including the sending teletypewriter.

b. Installation for Receive-Only Operation (para 2-13). When installed for receive-only operation, the teletypewriter can receive messages from other stations only. Messages cannot be sent from a teletypewriter installed for receive-only operation.

c. Installation for Full-Duplex Operation (para 2-15). When a teletypewriter is installed for full-duplex operation, messages can be sent from the teletypewriter but a copy of the transmitted messages is not printed by the sending teletypewriter. The page printer portion of the teletypewriter is used only to print messages received from other transmitting stations.

d. Installation for FADAC Operation (TT-537 /G). When Teletypewriter TT-537/G is installed in a FADAC system (para 2-14), it receives messages from the computer. The keyboard-transmitter is not normally used with this system.

2-10. Signal Line and Dc Power Connections, General

a. High Level Units Connections. Terminals 0 through 6 on the line terminal board (fig. 1-9 and 2-6) are provided for the connection of the signal lines and a dc power cord. SEND terminals 0, 1, and 2 are associated with the keyboard transmitter portion of the teletypewriter. REC terminals 3 and 4 are associated with the page printer portion. BATTERY terminals 5 and 6 are used for connection of dc power for the signal circuit. The proper connections vary in accordance with the operational requirements of the individual station, as described in paragraphs 2-9, and 2-11 through 2-15). Before making any connections to the line terminal board, proceed as follows:

(1) Turn the LINE INCREASE knob (fig. 3-1) fully counterclockwise.

(2) Set the LINE switch of the TT-4(*)/TG and TT-335/TG (fig. 1-7) to Dc line for 60-ma signal circuit operation (operation in a dc system) (fig. 1-3) or to VOICE FREQ LINE for 20-ma signal circuit operation (operation in a voice-frequency system). The LINE switch of the TT-537/G is equipped with a lock which holds the switch in the VOICE FREQ LINE position. Do not change the position of this switch.

(3) Check to be sure the teletypewriter is grounded properly (para 2-7).

NOTE

Send terminal 0 is used for an unusual application of the TT-4(*)/TG which is not covered in this manual. Installation for this application is performed by higher category maintenance personnel. Power cable Assembly CX-1202/U (fig. 1-5) is not supplied as part of the TT-4(*)/TG. If only the TT-4(*)/TG is furnished, and a local source of dc signal circuit power is to be used, obtain a length of two-conductor rubber-covered cable and make a suitable substitute for the CX-1202/U.

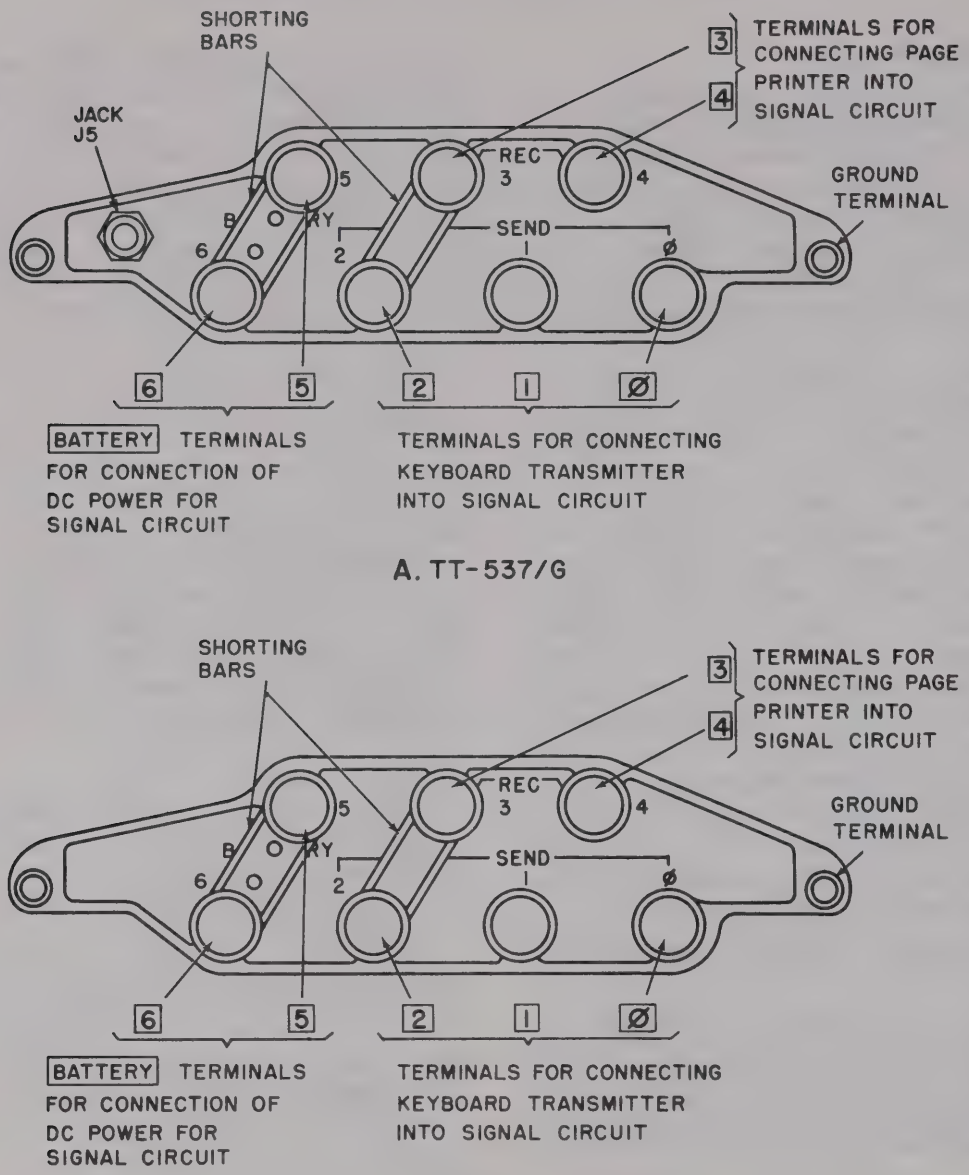
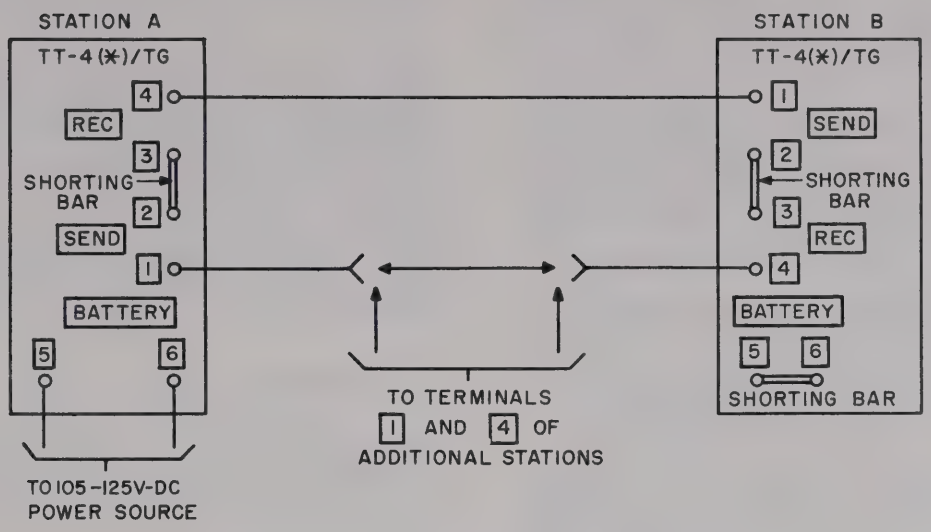
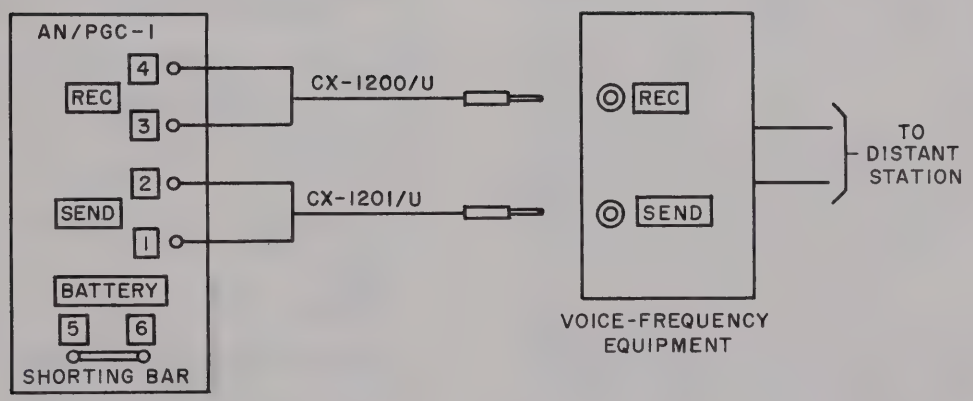


Figure 2-6. Line terminal board.



A. HALF-DUPLEX DC SYSTEM CONNECTIONS



B. HALF-DUPLEX VOICE-FREQUENCY SYSTEM CONNECTIONS

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Figure 2-7. Connections for half-duplex operation (not applicable to TT-698(*)/TG).

b. Low Level Units Connections (TT-698(*)/TG).

Signal line connections to low level units are made to terminal board A1TB1, as shown in figure 1-15. On these units, the send terminals are 1 and 2 and are labeled XMIT OUT, and the receive terminals are 4 and 5 and labeled RCVR IN. Terminal 3 provides a ground connection for signal cables' shields.

2-11. Connections for Half-Duplex Operation (Dc System). (Not Applicable to TT-698(*)/TG)

(A, Fig. 2-7)

a. Loosen the knurled nuts of terminals 2 and 3 (B, fig. 2-6). Connect the associated shorting bar across terminals 2 and 3 and tighten the nuts. Perform the steps in *b* or *c* below as applicable.

b. If power for the signal circuit is to be supplied locally, as shown on station A, part A of figure 2-7, connect one of the two signal lines to terminal 1 and the other line to terminal 4. Disconnect the shorting bar from terminals 5 and 6 and connect Power Cable Assembly CX-1202/U (fig. 1-5) to these terminals. Connect the plug of the power cable to a 105-125-volt, dc power source.

CAUTION

Observe the C.C. MILLIAMPERES meter (A, fig. 3-1) when connecting the power cable to the dc power source. If the meter pointer moves to the left of zero, disconnect power, reverse the leads connected to terminals 5 and 6, and reconnect power.

c. If power for the signal circuit is to be supplied by the distant station, as shown in station B, part A of figure 2-7, check to be sure the shorting bar is connected across terminals 5 and 6 and connect the two signal lines to terminals 1 and 4. Reverse the signal lines if the meter pointer moves to the left of zero when the signal circuit is energized.

2-12. Connections for Half-Duplex Operation (Voice-Frequency System) (Not Applicable to TT-698(*)/TG)

(B, fig. 2-7)

a. Connect the shorting bar across terminals 5 and 6 (B, fig. 2-6).

b. Loosen the knurled nuts of terminals 2 and 3 and pivot the shorting bar that is attached to terminal 3 away from terminal 2. Connect Cable Assembly CX-1201/U (fig. 1-5) to terminals 1 and 2.

NOTE

Cable Assembly CX-1201/U is equipped with a black telephone-type plug at one end and Cable Assembly CX-1200/U has a similar type red plug.

c. Connect Cable Assembly CX-1200/U to terminals 3 and 4 (fig. 1-5).

d. Insert the red plug in the REC jack of the voice-frequency equipment, and insert the black plug into the SEND jack. Reverse the leads connected to terminals 3 and 4 if the pointer of the D.C. MILLIAMPERES meter (A, fig. 3-1) moves to the left of zero when the REC signal circuit is energized. Refer to paragraph 5-3 for additional installation details if the voice-frequency equipment is the TH-5/TG: for information on voice-frequency equipment other than TH-5/TG, refer to the technical manual that covers the equipment.

2-13. Connections for Receive-Only Operation

a. High Level Units (A, fig. 2-8). When a teletypewriter is connected for receive-only operation, the source of power for the signal line normally is located at the transmitting station. Connect one of the station's Two signal lines to terminal 3 of the line terminal board (B, fig. 2-6) and the other signal line to terminal 4. Reverse the connections to terminals 3 and 4 if the C.C. MILLIAMPERES meter pointer moves to the left of zero.

b. Low Level Units (fig. 1-15). Connect the two signal lines to RCVR IN terminals 4 and 5 of A1TB1.

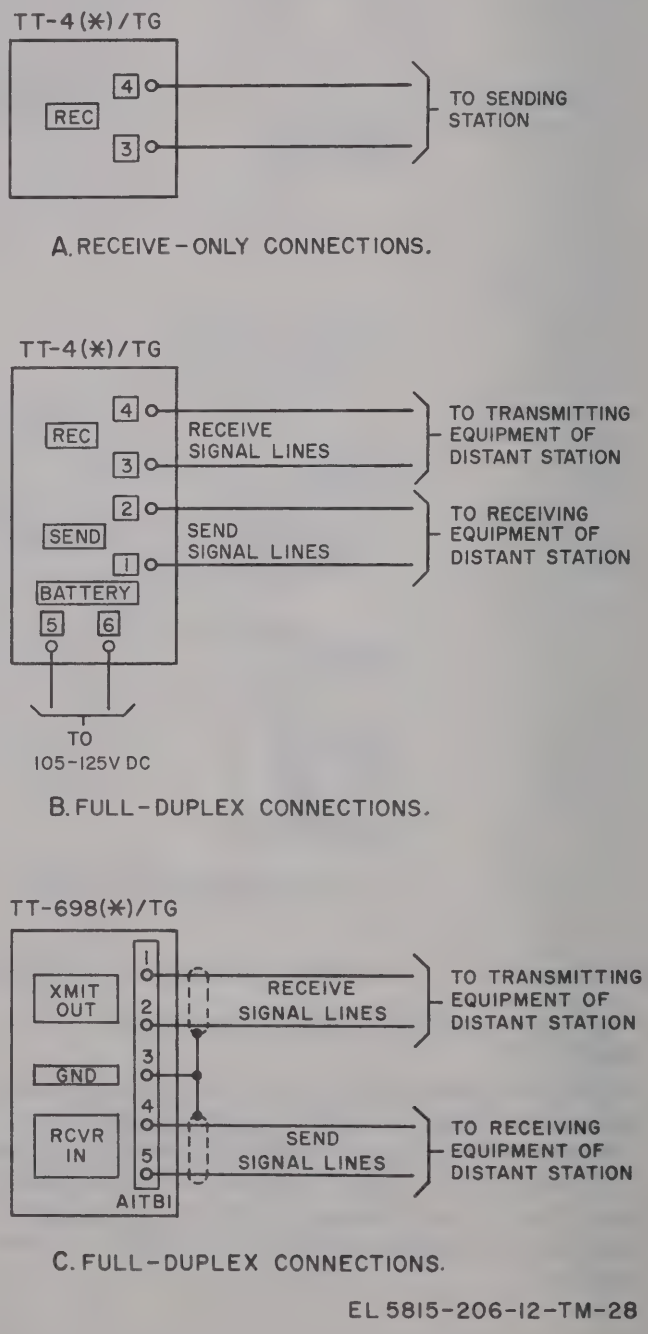


Figure 2-8. Connections for receive-only and full-duplex operations.

2-14. Connections for Operation in FADAC System (TT-537/G)

(A, fig. 2-6)

Turn off all equipment. Insert the telephone-type plug at the end of the line cable (fig. 1-6) into the mating connector on the line terminal board located behind the hole in the left side of the TT-537/G dust cover (fig. 1-8). Connect the 55-pin connector of the line cable to the mating connector of the computer. If the telephone-type plug is damaged, connect the signal lines directly to line terminals 3 (—) and 4 (+).

2-15. Connections for Full-Duplex Operation

a. High Level Units (B, fig. 2-8).

(1) Loosen the nuts of terminals 1 through 6 of the line terminal board (B, fig. 2-6) and move both shorting bars on the line terminal board to the vertical position (lower end of bars not in contact with any lower terminal).

(2) Connect one of the two *receive* signal lines to terminal 3; connect the other signal line to terminal 4. If the pointer of the D.C. MILLIAMPERES meter (A, fig. 3-1) does not move to the right, reverse the connections to terminals 3 and 4.

(3) Connect either of the *send* signal lines to terminal 1; connect the other signal line to terminal 2.

(4) Connect the two leads of Power Cable Assembly CX-1202/1U (fig. 1-5) to terminals 5 and 6. Connect the plug on the other end of the CX-1202/U to a 105-125-volt, dc power source.

NOTE

When connected for full-duplex operation ((1) through (4) above), each station normally provides power only for the signal circuit connected to its SEND terminals (send circuit). To provide power at a station for the receive circuit also, connect one of the receive signal lines to terminal 6 (instead of terminal 3 ((2) above) connect a jumper from terminal 3 to terminal 5, and make all other connections exactly as described in ((1) through (4) above. See caution, paragraph 2-11*b*.

b. Low Level Units (TT-698(*)/*TG*) (C, fig. 2-8).

(1) Connect the two *send* signal lines to the XMIT OUT terminals of A1TB1.

(2) Connect the two *receive* signal lines to the RCVR IN terminals of A1TB1.

(3) Connect signal lines ground shields to the GRD terminal of A1TB1.

2-16. Connections for Ground-Return Signal Circuit

A ground-return signal circuit includes only one metallic path between two stations; the earth is used as the return path to complete the circuit. Establish a ground-return signal circuit as follows at each station:

a. Establish a good ground connection point as described in paragraph 2-7*b* (2).

b. Connect an insulated wire from the ground connection point to one of the two line terminal board terminals that are associated with the signal circuit.

c. Connect the signal line to the other terminal associated with the signal circuit.

2-17. Line Current Adjustment (TT-4(*)/TG and TT-335/TG)

For circuit line-up purposes, one of the stations (normally the station of highest authority) is designated the control station and the others are designated noncontrol stations. Be sure the LINE INCREASE knob (fig. 3-1) is fully counterclockwise at the control station and fully clockwise at all noncontrol stations before beginning the line current adjustment procedure during installation of the teletypewriter.

a. Half-Duplex Operation (*Dc System*) (A, fig. 2-7).

(1) The operator at the control station must slowly turn the LINE INCREASE knob clockwise until the pointer of the D.C. MILLIAMPERES meter (fig. 3-1) indicates 75 on the meter scale.

(2) If only one station is connected to the control station teletypewriter, the operator at the noncontrol station must slowly turn the LINE INCREASE knob counterclockwise until the pointer of his meter indicates 60 on the meter scale. If more than one noncontrol station is in the circuit, the operator at each noncontrol station, in turn, must turn his LINE INCREASE knob counterclockwise slowly to decrease the meter reading in equal amounts until the meter indicates 60 (*for example,* in a three-station circuit, each of the two noncontrol stations would decrease the current reading approximately 7½ ma).

b. Half-Duplex Operation (Voice-Frequency System) (B, fig. 2-7). Turn the LINE INCREASE knob clockwise slowly until the pointer indicates 20 milliamperes on the meter scale.

c. Full-Duplex Operation (B, fig. 2-8). Turn the LINE INCREASE knob clockwise slowly until the pointer indicates 60 milliamperes on the meter scale.

NOTE

When a TT-4(*)/TG is installed for full-duplex operation (B, fig. 2-8), the LINE INCREASE knob is used to adjust the value of current in the receive circuit only

(circuit that is connected to terminals 3 and 4). The value of current in the send circuit (circuit that is connected to terminals 1 and 2) must be adjusted by the operator at the distant end of that circuit.

d. Receive-Only Operation (A, fig. 2-8). Turn the LINE INCREASE knob clockwise slowly until the pointer indicates 60 ma on the meter scale.

2-18. Line Current Adjustment (TT-537/G)

After the signal line connections are made and the computer is energized to provide a continuous marking condition on the line, adjust the LINE INCREASE potentiometer until the MILLIAMPERES meter indicates 20 ma.

2-19. Line Current Adjustment (TT-698(*)/TG)

On the TT-698(*)/TG the line current is established by the input circuit resistance of the receiver module. The line current is approximately 100 micro-amperes. The LINE INCREASE control is used on TT-698(*)/TG, low level units to adjust the selector magnet current to an optimum value. With either a continuous mark test signal or A1TB1, terminals 1 and 2 jumpered to terminals 4 and 5 and the keyboard stopped, adjust the LINE INCREASE potentiometer until the DC MILLIAMPERES meter indicates exactly 20mA.

2-20. ARMATURE and RANGE Dials Adjustment

(fig. 3-1)

NOTE

Be sure the line current is of the proper value (para 2-17) before this adjustment is made. On the TT-698(*)/TG, insure the selector magnet current is set at the optimum value (para 2-19).

The ARMATURE and RANGE dials, as shown in figure 3-1, are associated with the page printer portion of the teletypewriter. *Continuous* reception of test signals (usually alternate R and Y signals, transmitted from the distant station) is necessary for adjustment of these dials. Arrange to have these signals transmitted from the distant station and adjust the dials as described in *a* through *d* below.

a. ARMATURE Dial Preliminary Adjustment.

(1) Loosen the RANGE dial lock, set the RANGE dial at 65, and tighten the dial lock.

(2) Loosen the ARMATURE dial lock and turn the ARMATURE dial counterclockwise *slowly* until the page printer begins to print errors. Note the dial position at that point.

(3) Turn the ARMATURE dial clockwise *slowly* until the page printer resumes printing correctly. Continue turning the dial clockwise until the page printer again begins to print errors. Note the dial position at that point.

(4) Set and lock the ARMATURE dial midway between the two readings ((2) and (3) above).

b. RANGE Dial Preliminary Adjustment.

CAUTION

Never change the position of the RANGE dial while the page printer is idle.

(1) Loosen the RANGE dial lock and turn the RANGE dial counterclockwise *slowly* until the page printer begins to print errors. Note the dial position at that point.

(2) Turn the RANGE dial clockwise *slowly* until the page printer resumes printing correctly. Continue turning the dial clockwise until it again begins to print errors. Note the dial position.

(3) Set and lock the RANGE dial midway between the two readings (1) and (2) above.

c. ARMATURE Dial Final Adjustment. This adjustment is identical with the ARMATURE dial preliminary adjustment (*a* above) except that it is performed *after* the RANGE dial preliminary adjustment (*b* above) and that step in *a*(1) above is omitted.

d. RANGE Dial Final Adjustment. This adjustment is identical with the RANGE dial preliminary adjustment (*b* above) except that it is performed *after* the ARMATURE dial *final* adjustment.

2-21. Installation Final Test

After installation, perform a complete operational test of the teletypewriter before beginning the transmission of official traffic.

a. Make the checks listed in the equipment performance check list, as described in paragraph 4-8.

b. Have the distant operator transmit a test message and observe the typewritten copy. The conventional test message is as follows: "THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG's BACK 123456789-$!"( )"/-:;?,.".

c. Transmit the same test message to the distant station for a performance test of the equipment at the distant station.

CHAPTER 3

OPERATION

Section I. CONTROLS AND INDICATORS

3-1. Controls

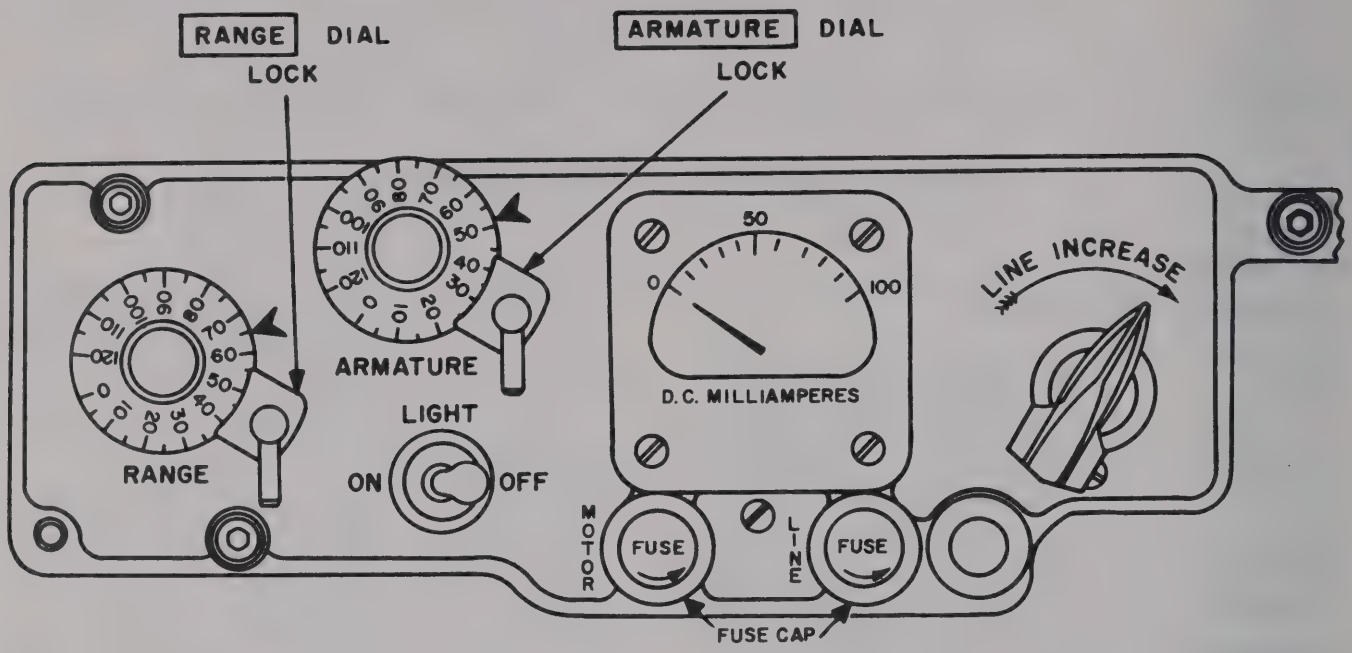
a. Keyboard Controls (fig. 2-5).

Control	*Function*
FIGS key	When pressed, platens of all teletypewriters in the circuit are moved to figures-shift position for typing of upper case symbols or performance of mechanical operations indicated above letters on alphabet keys.
LTRS key	When pressed, after use of FIGS key, platens of all teletypewriters in the circuit are moved to letters-shift position for typing of letters.
LINE FEED key	When pressed, paper of all teletypewriters in the circuit is advanced 1- or 2-line spaces on platen. Adjustable for single or double line feed.
CAR. RET. key	When pressed, type-bar carriages (fig. 1-9) of all teletypewriters in the signal circuit are moved to left margin of paper.
BELL key	When pressed while platen is in figures-shift position, signal bell is rung to signal teletypewriter operators.
STOP key (Not applicable to TT-698(*)/TG)	When pressed while platen is in figures-shift position, stops motors of all interconnected teletypewriters that are equipped with a motor-stop feature.
Alphabet keys	When platen is in letters-shift position, pressing of each alphabet key causes printing of letter shown on keytop. When platen is in figures-shift position, pressing of each alphabet key causes printing of symbol illustrated on key stop, ringing of signal bell (S key), or stopping of motor (H key).
Blank key	When pressed, causes transmission of special-purpose blank code group.
Space bar	When pressed and instantly released, causes type-bar carriage to move one space to the right. When held down, causes type-bar carriage to continue moving to the right until right margin is reached.
MOTOR switch	Turns motor on and off for initial starting and complete shut down of teletypewriter.
BREAK switch	While pressed (half-duplex operation only (para 2-9) opens signal circuit to interrupt transmission from other teletypewriters. Also restarts motors when motors were stopped by depression of STOP key.
Keyboard lock	When clamped in rearward position, prevents transmission from keyboard transmitter. Transmission possible when clamped in forward position.

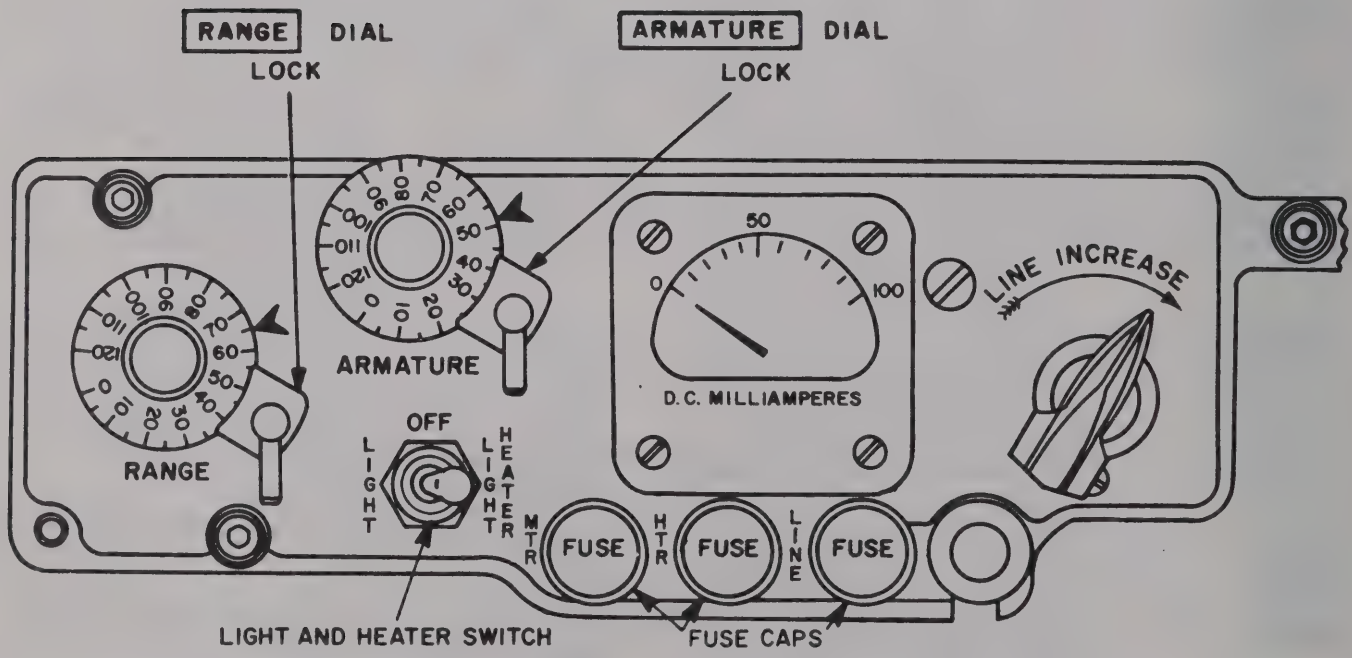
b. Control Panel Controls (fig. 3-1).

Control	*Function*
LINE INCREASE knob [a] (TT-4(*)/TG, TT-335/TG and TT-537/TG)	Used to adjust signal line current, Turn clockwise to increase current. Turn counterclockwise to decrease current.
ARMATURE dial	Used to adjust tension of selector-magnet armature spring.
ARMATURE dial lock	Used to lock ARMATURE dial at selected dial position. Turn clockwise to unlock dial.
RANGE dial	Used to adjust receiving mechanism for best performance.
RANGE dial lock	Used to lock RANGE dial at selected position. Turn clockwise to lock; counterclockwise to unlock dial.
LIGHT switch (TT-4(*)/TG)	Used to switch illuminating lamp on or off.
LIGHT-HEATER switch (TT-335/TG and TT-537/G)	Used to switch illumination lamp or lamp and heaters on and off.

[a] On TT-698(*)/TG, used to adjust selector magnet current to optimum value.



A. TT-4(*)/TG



B. TT-335/TG AND TT-537/G

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Figure 3-1. Control panel.

c. Miscellaneous Controls.

Control	*Function*
LINE switch (fig. 1-9) (TT-4(*)/TG and TT-335/TG)	Used to adjust internal wiring for type of incoming signals. Set to VOICE FREQ LINE position for operation with 20-ma signals. Set to DC LINE for operation with 60-ma signals.
LINE switch (TT-537/G)	Must remain in VOICE FREQ LINE position.
Platen knob (fig. 1-9)	Used to turn platen for manual feeding of recording paper.
Pressure roller lever (fig. 3-2)	Used to release pressure of pressure rollers against platen.
Platen lever latch (all models except TT-4A/TG) (fig. 3-2)	Use to lock pressure roller lever in either pressure or release position.
Single-double line feed lever (fig. 3-2)	Used to adjust line-feed mechanism for single or double line feed.
Ribbon spool locks (fig. 3-3)	Used to lock ribbon spools in spool cups.
Manual carriage return knob (fig. 1-10)	When pressed inward, function is same as CAR. RET. key (*a* above), but does not affect other teletypewriters.

3-2. Indicators

Indicator	*Function*
Margin bell	Rings automatically on 66th character to warn operator that end of line is near.
Signal bell	Used to signal distant operator.
D. C. MILLIAMPERES meter (fig. 3-1).	Indicates amount of current in signal line. ON TT-698(*)/TG, indicates selector magnet current only.

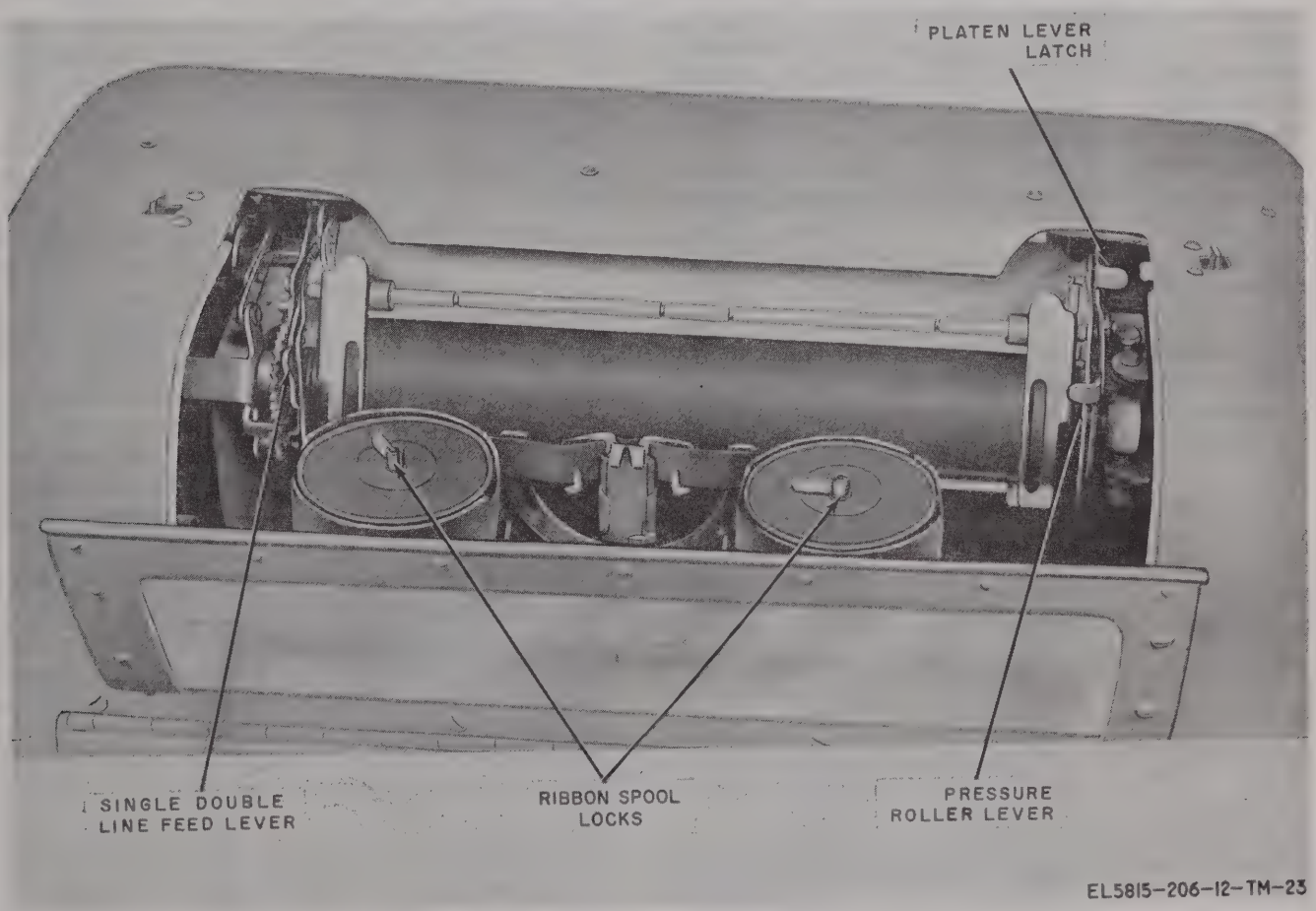

Figure 3-2. Platen controls (all models except TT-4A/TG and TT-698/TG).

Section II. OPERATION UNDER USUAL CONDITIONS

3-3. Modes of Operation

The teletypewriter includes two major operating units: the keyboard transmitter and the page printer. These units may be used for full-duplex, receive-only, or half-duplex operation (fig. 3-3) as determined by the installation procedure. The

performance capabilities of each mode of operation are described in paragraph 2-9. To operate the teletypewriter for any of the modes, perform the following:

a. Preliminary starting procedure (para 3-4).
b. Starting procedure (para 3-7).
c. Operating procedure (para 3-8).
d. Stopping procedure (para 3-9).

3-4. Preliminary Starting Procedure

a. Check to be sure that the motor power cord is plugged in to the power outlet. If Cable Assemblies CX-1200/U and CX-1201/U (fig. 1-5) are used, check to be sure that their plugs are fully inserted into the appropriate jacks of the associated equipment. If Power Cable Assembly CX-1202/U is used, be sure that its plug is inserted fully into the dc power receptacle. Also, see that the C.C. MILLIAMPERES meter (fig. 3-1) indicates a line current value of 60 milliamperes (ma) if the LINE switch (fig. 1-9) is in the DC LINE position, or 20 ma if the LINE switch is in the VOICE FREQ LINE position.

b. Check the supply of recording paper. If necessary, install a new roll of recording paper (para 3-5).

c. Check the condition of the inking ribbon. Replace the ribbon if it is worn or frayed (para 3-6).

d. Push the single-double line-feed lever (fig. 3-2) to the rearward position for single line feed; pull it to the forward position for double line feed.

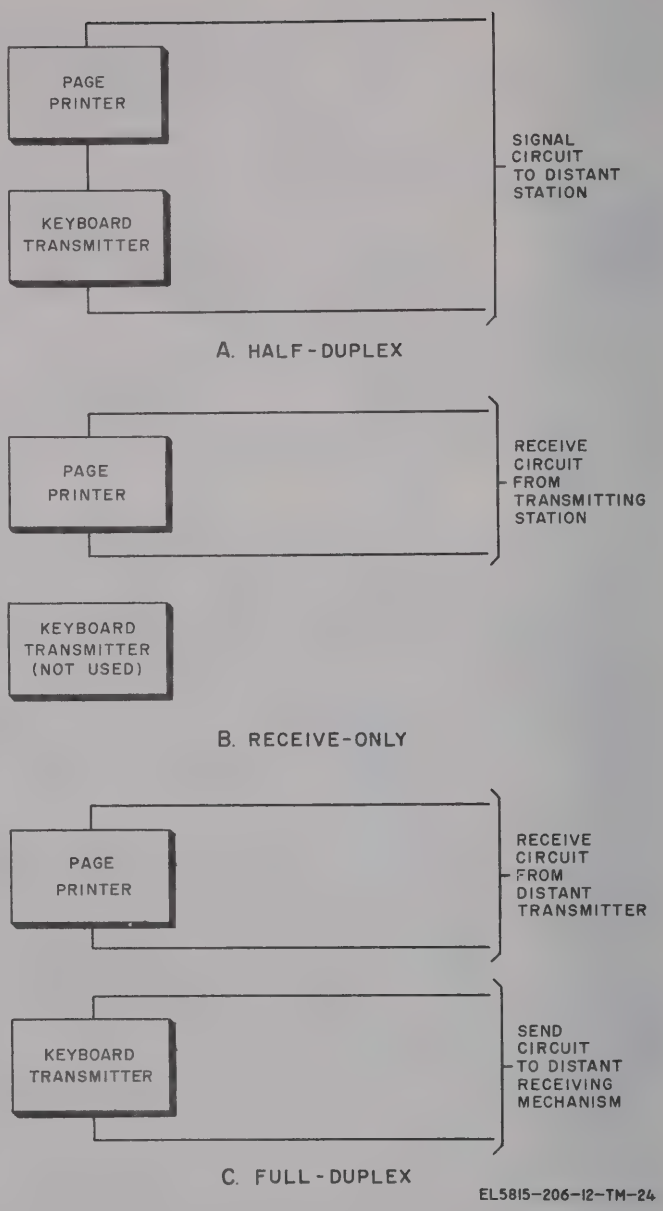

Figure 3-3. Modes of operation.

3-5. Installing Recording Paper

a. Remove the dust cover as follows:

(1) Loosen the two knurled nuts and disconnect the dust cover ground lead from each front corner of the dust cover as shown in figure 1-7.

(2) If the teletypewriter is a TT-4A/TG or TT-698/TG, push the front and then the rear of the dust cover upward slightly to release it from the four dust cover springs as shown in figure 1-12. If it is a model other then the TT-4A/TG or TT-698/TG, turn the cam-lock knob at the lower edge of each side of the dust cover. Press the platen knob (fig. 1-9) inward and lift the dust cover straight upward from the base.

b. Check the amount of recording paper that is on the roll mounted in the teletypewriter. If the paper supply is not low, replace the dust cover. If the paper supply is low, install a new roll of recording paper as follows:

(1) On TT-4(*)/TG, TT-335/TG, and TT-698(*)/TG, push the ends of the two retaining springs (fig. 3-4) upward and lift the paper roll shaft from the slots in the two mountings. Operate the two retaining levers of the TT-537/G to release the paper roll shaft.

(2) Insert the paper roll shaft into the new roll of recording paper.

(3) Hold the roll as shown in figure 3-4. Push upward to raise the retaining springs (or levers) and slide the end pins of the paper roll shaft into the slots in the mountings. Be sure the paper, when unwound from the roll, is drawn upward between the roll and the paper chute.

(4) Pull the end of the paper through the paper chute, pass the paper downward behind the platen, as shown in figure 1-9, and turn the platen knob until several inches of paper appear at the front of the platen. Do not allow the paper to wind around the platen and downward behind it again.

(5) If the paper is not centered on the platen, push the pressure roller lever of the TT-4A/TG or TT-698/TG slightly to the right and then forward to the pressure release position, or lift the platen lever latch (fig. 3-2) of all models except the TT-4A/TG and TT-698/TG. Move the pressure roller lever forward, and lower the platen lever latch. Center the paper on the platen and restore the pressure roller lever to the rearward (pressure) position.

(6) Replace the dust cover and connect the cover ground leads to the front corners of the cover as shown in figure 1-7.

(7) Open the top door of the dust cover, turn the platen knob until the end of the paper extends over the top of the cover, and close the cover.

3-6. Installing or Changing Inking Ribbon

Perform the steps in *a, b,* and *d* below for initial installation of an inking ribbon on the teletypewriter. To replace a worn inking ribbon, perform the step in *c* below also.

a. If the teletypewriter is a TT-4A/TG or TT-698/TG, remove the dust cover as described in paragraph 3-5*a*. If it is any model other than the TT-4A/TG or TT-698/TG, swing the top door forward as shown in figure 3-2 to permit access to the inking ribbon.

b. Press and release the CAR. RET. key as shown in figure 2-5 and then hold down the space bar until the typebar carriage has moved to the middle of the platen.

c. Remove the old ribbon as follows:

(1) Hold one end of the ribbon reverse beam, as shown in figure 1-9, midway between the upper and lower positions and turn one of the ribbon spool locks (fig. 3-5) manually until all the ribbon is wound on one spool.

(2) Unhook the old ribbon from the ribbon guide.

(3) Raise both ribbon spool locks to the vertical position.

(4) Operate the ribbon sensing lever that is below the empty spool and lift the empty spool from the teletypewriter. To operate the ribbon sensing lever of the TT-4A/TG or TT-698/TG, fig 1-9 press the lever of all models except the TT-4A/TG and TT-698/TG, left the lever (fig. 3-5).

(5) Detach the end of the old ribbon from the empty spool.

(6) Remove the full spool ((4) above).

d. Install a new ribbon as follows:

(1) If the new ribbon is wound counter-clockwise on the new spool (when viewed from the top), place the new spool in the right-hand ribbon cup; if wound clockwise, place it in the left-hand ribbon cup.

NOTE

The larger opening in the ribbon spool is on the bottom of the spool.

(2) Operate the ribbon sensing lever (*c* (4) above) and turn the spool until the two lugs on the ribbon spool shaft are engaged with the two slots in the bottom of the spool.

(3) Pass the end of the ribbon through the slot in the ribbon spool and fasten the end to the empty spool. Of the two spearhead fasteners on the empty spool; use the one which points in the direction that the spool will turn when winding the ribbon on the spool. Stab the spearhead through the ribbon and 1 inch from the end and install the empty spool ((2) above).

CAUTION

Be sure the ribbon is not twisted at any point between the two ribbon spools.

(4) Engage the ribbon in the ribbon guide (fig. 3-5). Turn one of the spools until the ribbon is taut between the spools. Lower both ribbon spool locks to the locking position.

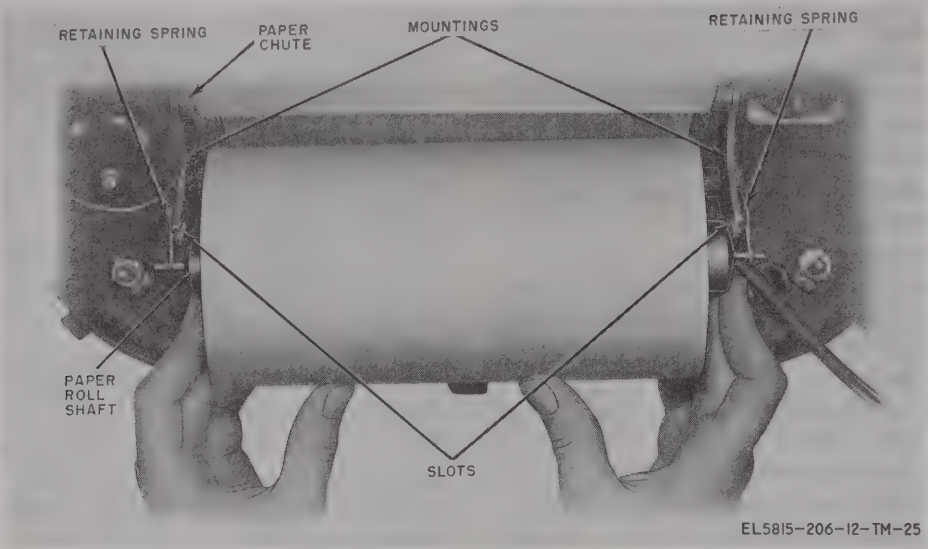

Figure 3-4. Installing roll of recording paper.

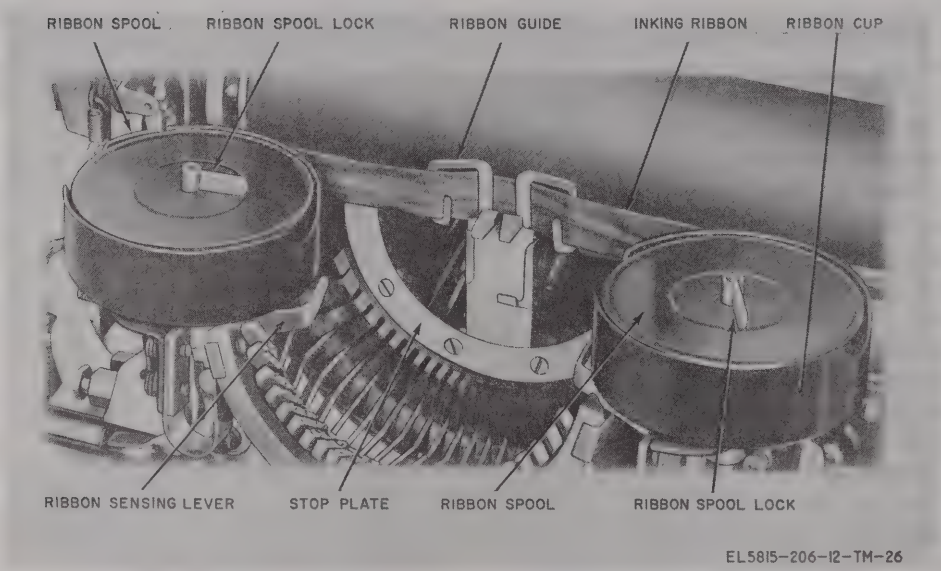

Figure 3-5. Inking ribbon mounted in teletypewriter (all models except the TT-4A/TG and TT-698/TG).

3-7. Starting Procedure

Before starting the teletypewriter, be sure the preliminary starting procedures in paragraph 3-4 have been accomplished.

a. If the MOTOR switch (fig. 1-9) is in the ON position, press the BREAK switch for a few seconds and release it. If the MOTOR switch is in the OFF position, move it to ON.

b. Lift the front door (fig. 1-7) to expose the control panel (fig. 3-1) and move the LIGHT switch to ON. When the TT-335/TG or TT-537/G is to operate in extremely cold temperatures,

operate the LIGHT-HEATHER switch to the LIGHT-HEATER position to maintain the required temperatures of operating parts.

3-8. Operating Procedure

a. Transmitting Messages. Message transmission is possible only when the teletypewriter is installed for either half-duplex or full-duplex operation. To transmit, operate the keys of the keyboard (fig. 2-5) in a way similar to that used when typing with an ordinary typewriter except as follows:

(1) Press the CAR. RET. key to return the type-bar carriage to the left-hand margin.

(2) Press the LINE FEED key to move the recording paper upward for the printing of a new line.

(3) Press the FIGS key to move the platen to the figures-shift position.

(4) Press the LTRS key to move the platen to the letters-shift position.

(5) Press the FIGS key and then the BELL key to signal the distant operator.

(6) Hold down the space bar to cause the type-bar carriage to move from left to right without printing. Release the space bar when the carriage has reached to the point at which printing is to begin.

b. Receiving Messages. Incoming messages are received and printed automatically by the page printer. Ocassionally, during reception, make the following checks:

(1) Check the printed copy to be sure that the page printer is operating properly.

(2) Check the recording paper to be sure that it is properly centered on the platen and that the paper supply is not running low.

NOTE

As the end of the paper nears, a red stripe appears down the center of the paper. This stripe is a warning that a new roll of paper must be installed.

(3) Examine the inking ribbon to be sure it is not twisted in the ribbon guide and that the ribbon is being unwound from one spool onto the other spool.

NOTE

To prevent accidental transmission during reception of a message, loosen the locknut (fig. 2-5), push the keyboard lock to the rear, and tighten the locknut. To permit later transmission, move the keyboard lock to the forward position.

3-9. Stopping Procedure

To stop the teletypewriter, use the applicable procedure described below.

a. Standby Condition (Not Applicable to TT-698 (*)/TG). To place all interconnected teletypewriters equipped with the motor-stop feature in the standby condition, press the FIGS key and then the STOP key (upper-case H). This action will cause the motors of all teletypewriters to stop. An operator at any of the teletypewriters can start all the motors by pressing and releasing the BREAK key. This feature permits an operator to start all teletypewriters, transmit his message, and stop all teletypewriters.

b. Complete Shut Down. To close a teletypewriter to traffic, move the MOTOR switch as shown in figure 1-9 and LIGHT (or LIGHT-HEATER) switch as shown in B, figure 3-1 to OFF.

CHAPTER 4

MAINTENANCE INSTRUCTIONS

4-1. Scope of Operator's Maintenance

The maintenance duties assigned to the operator of Teletypewriter Set AN/PGC-1 and Teletypewriters TT-4(*)/TG, TT-335/TG, TT-537/G, and TT-698(*)/TG are listed below together with a reference to the paragraphs covering the specific maintenenace function. The duties assigned do not require tools or test equipment other than those issued with the set.

a. Preventive maintenance (para 4-3).
b. Replacement of defective fuses (para 4-9*b*).
c. Cleaning (para 4-7).
d. Troubleshooting (para 4-10).
e. Installing or replenishing paper (para 3-5).
f. Installing or changing inking ribbon (para 3-6).
g. Replacing defective copy lamps (para 4-9*a*).

4-2. Tools, Material and Test Equipment Required for Maintenance

a. Trichloroethane, NSN 6810-00-292-9625 (qt).
b. Cleaning cloth, lint free, NSN 8305-00-267-3015.
c. No. 000 sandpaper, NSN 5350-00-264-3485.

4-3. Preventive Maintenance

Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, to reduce downtime, and to assure that the equipment is serviceable.

a. Systematic Care. The procedures given in paragraphs 4-4 and 4-7 cover routine systematic care and cleaning essential to proper upkeep and operation of the teletypewriter set.

b. Preventive Maintenance Checks and Services. The preventive maintenance checks and services charts as described in paragraphs 4-5 and 4-6 outline functions to be performed at specific intervals. These checks and services are to maintain Army electronic equipment in a combat serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining combat serviceability, the chart indicates what to check, how to check, and the normal conditions; the *References* column lists the paragraph that contains additional information. If the defect cannot be remedied by the operator, higher category of maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38-750.

4-4. Maintenance Service and Inspection Periods

Maintenance service and inspections of the AN/PGC-1, the TT-4(*)/TG, TT-335/TG, TT-537/G and the TT-698(*)/TG are required on a daily and weekly basis.

a. Paragraph 4-5 specifies services and inspections that must be accomplished daily in transportable installations and under special conditions listed below.

(1) When the equipment is initially installed.

(2) When the equipment is reinstalled after removal for any reason.

(3) At least once each week if the equipment is maintained in standby condition.

b. Paragraph 4-6 specifies maintenance services and inspection that must be performed once each week. If the equipment is being maintained in standby condition, the daily and weekly services and inspections, as described in paragraphs 4-5 and 4-6, should be accomplished at the same time.

4-5. Daily Maintenance Service and Inspection Chart

NOTE

The item numbers in the chart below are not consecutive; they are taken from the weekly maintenance service and inspection chart.

Item No.	Procedure		References
	Item	Normal condition or result	
1	SET: Inspect the equipment for		
	a. Completeness	*a.* Equipment must be complete	*a.* Paragraph 1-9
	b. Proper installation	*b.* Installation is in accordance with instructions.	*b.* Paragraphs 2-3, 2-4, 2-6, and 2-9
	c. Cleanliness	*c.* Units must be clean and dry inside and outside; free of dust, dirt, grease, rust, corrosion, or fungus.	*c.* Paragraph 4-6

Item No.	Procedure		References
	Item	Normal condition or result	
	d. Preservation	*d.* Painted surfaces must be free of bare spots, rust, and corrosion.	*d.* Paragraph 4-6*e*
10	BINDING POSTS AND TERMINALS: Inspect all external binding posts and terminals for cracks, breaks, dirt, loose screws, and loose connections and mountings.	All external binding posts and terminals are free of cracks, breaks, loose screws, loose connectors, and mountings, dirt, grease, rust, corrosion, and fungus, and are tight.	
13	INKING RIBBON: Inspect inking for frayed, cut, torn edges, twisting, or general wear.	Inking ribbon should be installed properly, free of twists, frayed, cut, or torn edges, and allow type pallet to print a full and clear character.	Paragraph 3-6
16	OPERATIONAL CHECKS: A complete operational check of the equipment shall be made. Be alert for any unusual performance or condition.	Check the equipment for normal operation and complete functional response in the send and receive transmission condition. Printed copy must be clear, legible, with horizontal alignment and spacing of characters within reasonable limits.	Paragraph 4-7

4-6. Weekly Maintenance Service and Inspection Chart

Item No.	Procedure		References
	Item	Normal condition or result	
1	SET: Inspect the equipment for—		
	a. Completeness	*a.* Equipment must be complete	*a.* Paragraph 1-9.
	b. Proper installation	*b.* Installation is in accordance with instructions.	*b.* Paragraphs 2-3, 2-4*a*, 2-6 and 2-9.
	c. Cleanliness	*c.* Units must be clean and dry inside and outside; free of dust, dirt, grease, rust, corrosion, and fungus.	*c.* Paragraph 4-6.
	d. Preservation	*d.* Painted surfaces must be free of bare spots, rust, and corrosion.	*d.* Paragraph 4-6.
2	PUBLICATIONS: Check that pertinent publications are available.	*a.* Operator's and organizational maintenance manual is complete and in useable condition without missing pages. *b.* All changes pertinent to the equipment are on hand.	DA Pam 310-4.
3	MODIFICATION WORK ORDERS: Check DA Pam 310-7 to determine if new applicable MWO's have been published.	All URGENT MWO's have been applied to the equipment. All NORMAL MWO's have been scheduled.	DA Pam 310-7.
4	GASKETS: Inspect waterproof gaskets for leaks, worn, or loose edges.	Gaskets are clean, flexible, and in good condition.	
5	GROUND RODS: Inspect for firm embedding of ground rods in dampened earth, clean and tight wire connections.	Ground rods are driven firmly into dampened earth and all grounding connections are clean and tight.	Paragraph 2-7*b*.
6	SWITCHES: Inspect all switches for smooth, positive action.	All switches are smooth and positive in action, and not loose in their mountings.	
7	TRANSIT CASES: Inspect for dents, splits, scraps, broken or missing latches, handles, and equipment supports or brackets.	Transit cases are free of any dents, splits, scrapes, broken or missing latches, handles, and equipment supports or brackets.	
8	CABLES AND CORDS: Inspect all external cables and cords for cuts, gouges, frayed, badly bruised, kinked, strained, dry rotted, or mildewed insulation.	All external cables and cords are free of any cuts, gouges, fraying, bad bruises, kinks, strains, dry rot, or mildewed insulation.	

Item No.	Procedure		References
	Item	Normal condition or result	
9	PLUGS AND CONNECTORS: Inspect for bent connector pins or plugs, chipped, cracked, or broken insulation, loose fittings, and cleanliness.	All plugs and connectors are snug fitting, free of bends or missing pins, cracked, chipped or broken insulation, and are free of dust, dirt, grease, rust, corrosion, and fungus.	
10	BINDING POSTS AND TERMINALS: Inspect all external binding posts and terminals for cracks, breaks, dirt, loose screws, and loose connections and mounting.	All external binding posts and terminals are free of cracks, breaks, loose screws, loose connectors, and mountings, dirt, grease, rust, corrosion, and fungus, and are tight.	
11	MOUNTINGS: Inspect for seating and stability of mounting; check for loose and missing hardware.	All bolts, nuts, and washers are present and properly tightened. Mounting shows no evidence of weakness or deformity.	
12	FUSES: Check for proper fuses (TT-4(*) only)	The fuses in use, and in the running spares, should be of the indicated value and located as follows: *a.* Control panel, line fuse, 1/8 amp, 250 volt (1 spare clipped to cover of transmitter mechanism, 5 other spare 1/8-amp fuses wrapped separately). *b.* Control panel, motor fuse, 1.6 amp, 125 volt (1 spare clipped to cover of transmitter mechanism, 5 other spare 1.6-amp fuses wrapped separately).	Paragraphs 1-6, 2-5, and 4-8*b*.
	TT-335/TG and TT-537/G	*c.* Same as *a* above. *d.* Control panel, motor fuse, 2 amp, 125 volt (1 spare clipped to cover of transmitter mechanism, 5 other spare 2 amp fuses in accessories bag). *e.* Control panel, light, and heater fuse, 3-amp, 125 volt (6 spare 3 amp fuses in accessories bag).	Paragraphs 1-6, 2-5 and 4-8.
13	INKING RIBBON: Inspect inking ribbon for frayed, cut, torn edges, twisted, or general wear.	Inking ribbon should be installed and threaded properly, free of twists, frayed, cut or torn edges, and allow type pallet to print a full and clear character.	Paragraph 3-6.
14	RECORDING PAPER: Check for clean, dry, discolored, or torn recording paper.	Recording paper is free of any dirt, mold, stains, and is dry, and has no tears or creases. Amount of paper on roll should be sufficient for normal operation.	Paragraph 3-5.
15	EQUIPMENT MARKINGS: Inspect equipment markings for cleanliness and legibility.	All equipment markings should be clean, complete, and legible.	
16	OPERATIONAL CHECK: A complete operational check of the equipment shall be made. Be alert for any unusual performance or condition.	Check the equipment for normal operation and complete functional response in the send and receive transmission condition. Printed copy must be legible, with horizontal alignment and spacing of characters within reasonable limits.	
17	RUNNING SPARES: Check all running spares for general condition and method of storage.	All running spares are in good condition and properly stored. There should be no evidence of overstock and all shortages will be on valid requisitions.	Paragraph 1-6.

4-7. Cleaning

Inspect the exteriors of the teletypewriter set and the teletypewriter. The exterior surfaces and window should be clean, free of dirt, grease, corrosion, and fungus.

a. Remove dust and loose dirt with a clean soft cloth.

WARNING

The fumes of trichloroethane are toxic. Provide thorough ventilation whenever used. DO NOT USE NEAR AN OPEN FLAME. Trichloroethane is not flammable, but exposure of the fumes to an open flame or hot metal surface forms highly toxic phosgene gas.

b. Remove grease, fungus and ground-in dirt from the cases; use a dampened cloth (not wet) with trichloroethane.

CAUTION

Be careful when cleaning around plugs and jacks; dirt forced into jacks will cause malfunctions.

c. Remove dust and dirt from plugs and jacks with a brush.

CAUTION

Do not press on meter faces (glass) when cleaning; the meter may become damaged.

d. Clean the front panels, meter, and control switches; use a soft clean cloth. If dirt is difficult to remove, clean with mild soap and water.

e. Clean rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper. Brush two thin coats of paint on the bare metal to protect it from further corrosion. Refer to applicable cleaning and refinishing practices specified in TB 43-0118.

4-8. Equipment Performance Checklist

Check the operation of the teletypewriter as instructed in the following checklist. Perform the checks in the sequence listed. If the corrective measures do not remove the trouble, higher category of maintenance is required.

4-8. Equipment Performance Checklist

Item No.	Item	Action	Normal indication	Corrective measures
1	D. C. MILLIAMPERES meter (fig. 3-1).	If current for signal circuit is to be furnished locally, turn on local dc power source. No action if signal circuit current is furnished by distant station.	For TT-4(*)/TG and TT-335/TG, meter indicates 20 ma if LINE switch (fig. 3-1) is in VOICE FREQ LINE position. Meter indicates 60 ma if switch is in DC LINE position. For the TT-537/G, in use with FADAC system, LINE switch is locked in VOICE FREQ LINE position and meter indicates 20 ma. Line current is not adjustable on the TT-698(*)/TG.	If meter indicates zero: Check for loose connection to dc power source (if current for signal circuit is supplied locally). Tighten loose connection. Check for loose signal line connection to line terminal board (fig. 2-6). Tighten loose line connection.
			The meter indicates selector magnet current normally set to 20mA. Also, the line switch is not applicable to the TT-698(*)/TG.	Check seating of cable plugs in associated equipment jacks if Cable Assemblies CX-1200/U and CX-1201/U (fig. 1-5) are used. Press plugs into jacks firmly. Check LINE FUSE (fig. 3-1). Replace fuse if blown. If meter indicates presence of current but not of proper value, adjust LINE INCREASE knob (fig. 3-1) to obtain proper current value (see normal indication for item 1).
2	BREAK switch (fig. 2-5)	Press momentarily	Pointer of D.C. MILLIAMPERES meter moves to zero and back to proper current value (see item 1 above) if teletypewriter is installed for half-duplex operation (fig. 2-7). No change in pointer position for receive-only and full-duplex operations (fig. 2-8).	Higher category of maintenance is required.
3	LIGHT switch (fig. 3-1).	Move to ON	Copy lamp in dust cover should light.	Check to be sure motor power cord is fully seated in ac power receptacle. Press dust cover downward to insure proper seating of cover on base. Check lamp; replace if defective.
4	MOTOR switch (fig. 2-5)	Move to ON	Motor should start	Press and release BREAK switch (fig. 2-5). Check MOTOR fuse (fig. 3-1) Replace if blown (para 4-9*b*).
5	Governor target (fig. 1-9)	Check motor speed with tuning fork (para 2-8).	Spots on target should appear stationary.	Adjust motor speed (para 2-8). (Not applicable to TT-335/G). If motor speed to TT-335/TG is incorrect, higher category of maintenance is required.

Item No.	Item	Action	Normal indication	Corrective measures
6	Keyboard keys	Transmit test message	Test message correctly printed by page printer.	Have distant station transmit test message. If this test message is printed correctly by page printer, higher category of maintenance of keyboard transmitter is required. If page printer prints incorrect copy regardless of source of signals, check adjustment of ARMATURE and RANGE dials (para 2-19).
7	FIGS key (fig. 2-5)	Press and release	Platen (fig. 1-9) moves to upper (figures-shift) position.	Higher category of maintenance is required.
8	LTRS key (fig. 2-5)	Press and release	Platen moves to lower (letters-shift) position.	Higher category of maintenance is required.
9	LINE FEED key	Move single-double linefeed lever (fig. 3-2) to lower position and press LINE FEED key.	Platen turns slightly to move printed line upward 1-line space.	Higher category of maintenance is required.
		Move single-double line-feed lever to upper position and press LINE FEED key.	Platen moves printed line upward 2-line spaces.	Higher category of maintenance is required.
10	Space bar (fig. 2-5)	Press and immediately release.	Type-bar carriage (fig. 1-9) moves 1 space to the right.	Higher category of maintenance is required.
		Press and hold down	Type-bar carriage moves to extreme right margin. Margin bell rings 6 spaces before carriage reaches right margin.	Higher category of maintenance is required.
11	CAR RET key	Press and release	Type-bar carriage moves to left margin.	Higher category of maintenance is required.
12	BELL (upper-case S) key	Press FIGS key and then BELL key.	Signal bell rings (sound is much louder than margin bell (item 10 above)).	Higher category of maintenance is required.
13	STOP (upper-case H) key	Press FIGS key and STOP key	Motor stops	Higher category of maintenance is required.
		With motor stopped, press BREAK switch (fig. 2-5).	Motor starts	Higher category of maintenance is required.
14	Keyboard lock (fig. 2-5)	Loosen locknut, move keyboard lock to rear position, tighten locknut, press and release any key of keyboard.	Teletypewriter does not transmit (no effect on page printer).	Higher category of maintenance is required.
		Move keyboard lock to forward position and press key of keyboard.	Page printer prints correct character.	Higher category of maintenance is required.
15	Inking ribbon	Transmit test message.	Ribbon lifted upward by ribbon guide (fig. 3-5) for printing of each character and moved downward after printing.	Check for binding of ribbon in ribbon guide.
			Ribbon slowly unwound from 1 ribbon spool on to other spool.	Check for proper attachment of ribbon to spool (para 3-6*d*(3)).

4-9. Replacement of Lamp and Fuses

a. Lamp Replacement.

(1) Remove the dust cover (para 3-5*a*).

(2) To remove the lamp, press the lamp into its socket in the dust cover, turn the lamp slightly, and pull it from the socket.

(3) Insert the new lamp into the socket, press and turn the lamp slightly to secure it firmly in the socket.

(4) Replace the dust cover. Be sure to reconnect the dust cover ground leads (fig. 1-7).

b. Fuse Replacement.

(1) Lift the front door (fig. 1-7).

(2) Press the fuse cap (fig. 3-1) inward, turn the cap slightly to the right, and pull the cap and fuse from the fuseholder.

(3) Insert the new fuse in the fuseholder and replace the fuse cap.

CAUTION

Be sure to install only fuses of the correct current rating (para 2-5) in the fuseholders.

4-10. Troubleshooting Chart

Malfunction	*Probable cause*	*Corrective action*
1. Motor fails to start.	Ac power fuse blown. Failure of power source.	Replace fuse (para 2-5 and 4-9*b*). Correct defect or use another power source (para 1-5).
2. No power.	Power cord not plugged in.	Connect power cord.
3. Copy lamp does not light.	Defective copy lamp.	Replace lamp (para 4-9*a*).
4. Shock from equipment.	Check for faulty ground.	Correct or request higher category of maintenance (para 2-3*e*).
5. Motor runs but speed is erratic.	Worn brushes.	Request higher category maintenance (para 2-8).
6. Ribbon does not feed or does not reverse.	Ribbon spool not seated correctly on driving collar spring tension on ribbon feed clutch. Ribbon spool gears not meshing.	Inspect spool for proper seat. Replace ribbon or request higher category maintenance (para 3-6).
7. Loss of all functions in set.	Fuses blown.	Check fuses (para 4-9*b*).
8. Mechanical binding.	Inspect for lubrication.	Request higher category of maintenance (para 4-2).
9. Poor print quality.	Inspect print pallets for dirt.	Clean with cleaner (para 4-7).
10. Running open (high level units)	Blown fuse, broken wire, or defective motor stop switch.	Inspect for correction or request higher category of maintenance.
11. Running open (low units).	External signal line open or shorted.	Inspect for correction or request higher category of maintenance.
	Space instead of mark impulses received.	Reverse input signal line leads.
12. Receiving unit operates, but range (range-finder measurement is narrow.	Motor speed incorrect.	Check motor speed.
	Selector mechanism improperly adjusted.	Request higher category of maintenance.
	Keyboard transmitter friction clutch improperly adjusted.	Request higher category of maintenance.
	Transmitter contacts (high level units) or contact assembly (low level units) out of adjustment.	Request higher category of maintenance.
13. Transmitter Mechanism transmits garbled copy.	Friction clutch dry or out of adjustment.	Request higher category of maintenance.
	Transmitter contacts dirty or out of adjustment (high level units).	Request higher category of maintenance.
	Transmitter contact assembly out of adjustment (low level units).	Request higher category of maintenance.
	Contact bail spring weak (high level units).	Request higher category of maintenance.
	Keyboard transmitter plug disconnected.	Reconnect (para 2-6*d* and *e*).
	Key-levers blocked.	Release keyboard lock.
14. Binding or noisy.	Check for lubrication.	Request higher category of maintenance.
15. Transmitter camshaft rotates continuously.	Locking lever latch spring broken or disconnected.	Replace or connect.
	Repeat-blocking-lever spring broken or disconnected.	Replace or connect.
16. Motor runs but no transmission from keyboard, and page printer does not print.	The 30Vdc power supply is inoperative.	Request higher category of maintenance.

4-11. **Replacement Lubrication Schedule**

a. Lubrication of this equipment is a direct support procedure which must be performed only by a qualified teletypewriter repairman.

b. Organizational personnel should refer to the following chart and alert the direct support unit when lubrication is required.

Operating speed (wpm)	Operating time (hours per day)	Lubrication interval (days)
60	8 or less	30
	8 to 12	20
	12 to 16	15
	16 to 24	10
66	8 or less	27
	8 to 12	18
	12 to 16	13
	16 to 24	9
75	8 or less	24
	8 to 12	16
	12 to 16	12
	16 to 24	8
100	8 or less	18
	8 to 12	12
	12 to 16	9
	16 to 24	6

CHAPTER 5

AUXILIARY EQUIPMENT

5-1. General

a. Auxiliary equipment normally is not required for direct communication between tactical military teletypewriters separated by relatively short distances. As the distance between teletypewriters is increased, auxiliary equipment is required to assure reliable interoperation of the teletypewriters.

b. Convenient switching of tactical teletypewriter traffic also requires auxiliary equipment. This equipment converts the dc signals transmitted from the sending teletypewriter into ac signals that can be switched through telephone and radio equipment. Similar auxiliary equipment is required at the distant station to convert the ac signals back into dc signals for operation of the receiving teletypewriter.

c. Telegraph Terminal TH-5/TG, or equal, is normally used with high-level military teletypewriters to meet the requirements in *a* and *b* above.

5-2. Purpose of Telegraph Terminal TH-5/TG

Telegraph Terminal TH-5/TG, when used with the AN/PGC-1, converts the dc signals, which it receives from the keyboard transmitter of the sending teletypewriter into voice-frequency signals. The voice-frequency signals are then transmitted either directly to another TH-5/TG at the receiving station, through telephone switching equipment to the distant TH-5/TG, or through other carrier or radio equipment to the TH-5/TG at the distant station as shown in figure 1-3. The TH-5/TG at the distant station converts the received voice-frequency signals back to dc signals and transmits the dc signals to the page printer of the receiving teletypewriter. The TH-5/TG also permits simultaneous teletypewriter and telephone transmission over a signal circuit when the TH-5/TG is used in conjunction with other auxiliary equipment.

5-3. Use of TH-5/TG with AN/PGC-1

a. Installation.

(1) Prepare the TH-5/TG for operation as follows:

(*a*) Place the TH-5/TG on a firm support within 3 feet of the teletypewriter.

(*b*) Connect the signal lines from the distant station to the binding posts on the front panel of the TH-5/TG. Refer to TM 11-5805-25-15 for installation options of the TH-5/TG. Set the 4W-2W-TEL switch on the front panel of the TH-5/RG to the proper position for the installation option used.

(*c*) Connect the power cord of the TH-5/TG to a source of 115-volt, 50- to 60-Hz ac.

(2) Prepare the teletypewriter for operation (para 2-4 through 2-8).

(3) Connect the teletypewriter to the TH-5/TG (para 2-10 and 2-12).

(4) Turn the LINE INCREASE knob (fig. 3-1) on the teletypewriter until the D.C. MILLIAMPERES meter indicates 20 ma.

NOTE

The current level in the teletypewriter send circuit is determined by the circuitry of the TH-5/TG and is not adjustable.

b. Operation. Operate the teletypewriter as described in paragraphs 3-4, 3-7, 3-8, and 3-9, except as follows:

(1) Before starting transmission from the teletypewriter, be sure the lamp on the front panel of the TH-5/TG is lighted. This lamp is a busy signal that goes out when any teletypewriter in the circuit begins transmitting.

(2) When the teletypewriter is connected through a TH-5/TG to a telephone switchboard, signal the switchboard operator as follows:

(*a*) Press and release the RING switch on the TH-5/TG to signal the operator of a local-battery switchboard.

(*b*) Operate the 4W-2W-TEL switch to the 2W position (2-wire operation) or to the 4W position (4-wire operation) to signal the operator of a common battery switchboard. At the completion of transmission, operate the switch to the TEL position.

CHAPTER 6

PREPARATION FOR LIMITED STORAGE

NOTE

Refer to paragraph 1-5 for general storage information. The following procedures are specific instructions for preparation of the teletypewriters for limited storage.

6-1. Disassembly of TT-4(*)/TG and TT-335/TG

a. Disconnect the motor power cord from the ac power source.

b. Disconnect the plug of Power Cable Assembly CX-1202/U (fig. 1-5) if used, from the dc power source.

c. If Cable Assemblies CX-1200/U and CX-1201/U (fig. 1-5) were used, pull their plugs from their associated jacks.

d. Remove the dust cover (para 3-5*a*).

e. Disconnect all cable assemblies or signal lines from the terminals of the line terminal board (fig. 2-6). Disconnect the protective ground from the ground terminal.

f. Remove the roll of recording paper from the rear of the teletypewriter.

g. Wind the motor power cord into a coil and tie the coil under the paper chute.

h. Set the following locking devices in the locking position (para 2-6):

(1) Platen lock.
(2) Carriage lock.
(3) Keyboard lock.
(4) Blocking plate.

i. Fill the type basket portion of the type-bar carriage (fig. 1-9) with cloth or other suitable wadding and tie the wadding securely to the type-bar carriage to prevent movement of the type bars during shipment.

j. Replace the dust cover and immersionproof cover.

6-2. Disassembly of TT-537/G

a. Disconnect the plugs of the motor power cable and line cable from the mating connectors of the computer. Remove the line cable-plug from the teletypewriter jack.

b. Open the top door of the dust cover and slide the carriage fully to the left-hand margin position and move the carriage lock lever (fig. 2-4) forward to lock the carriage in position.

c. Check to see if the platen is in the letters-shift position. If it is not, operate the letters-shift crank to move the platen to the letters-shift position. Operate the platen lock lever (fig. 2-3) to the left to lock the platen. Close the top door of the dust cover.

d. Wind the motor power cable around the dust cover counterclockwise and clamp the connector to the front of the dust cover; use the clamping device. Install and secure the immersionproof cover.

e. Coil the line cable and insert it into the accessories bag (fig. 1-6).

NOTE

If operation of the TT-537/G is to be virtually continuous, with interruptions only for short-distance moves, one roll of recording paper may remain installed within the dust cover to permit more rapid disassembly and reassembly of the equipment.

6-3. Repackaging for Limited Storage or Shipment

a. Insert the teletypewriter into the case (fig. 2-1).

b. Insert the accessories bag of the TT-537/G in the space between the teletypewriter and the case. Insert the cable assemblies and spare parts into Bag CW-356/U, secure the straps and the bag in place on top of the teletypewriter. Place the technical manuals in a bag of moistureproof material, if available, and wedge the manuals between the teletypewriter and the case.

c. Insert the wooden blocks (fig. 1-13) to wedge the teletypewriter securely in the case.

d. Strap the recording paper rolls to the lid of the case. (See note, paragraph 6-2*e*).

e. Close the lid and latch the lid securely to the case.

APPENDIX A

REFERENCES

The references listed below are applicable to the operation of Teletypewriter Sets AN/PGC-1, AN/PGC-3, Teletypewriters TT-4(*)/TG, TT-335/TG, TT-537/TG, and TT-698(*)/TG:

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (type 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	Index of Modification Work Orders.
SB 700-50	Expendable Items: (Except Medical, Class V, Repair Parts and
CAT 50-970	Heraldic Items).
SB 708-42	Federal Supply Code for Manufacturers — United States and Canada — Code to Name (Cataloging Handbook H4-2).
TB 43-0118	Field Instructions for: Painting and Preserving Electronics Command Equipment.
TM 11-5805-254-15	Operator's, Organizational, Field and Depot Maintenance Manual: Terminal Telegraph—Telephone AN/TCC-14.
TM 11-6625-1668-12	Operator and Organizational Maintenance Manual Including Repair Parts and Special Tool List: Test Sets, Telegraph AN/GGM-15(V)1 and AN/GGM-15(V)1 and 2.
TM 38-750	The Army Maintenance Management Systems (TAMMS).

APPENDIX B

BASIC ISSUE ITEMS LIST (BIIL) AND ITEMS TROOP INSTALLED OR AUTHORIZED LIST (ITIAL)

Section I. INTRODUCTION

B-1. Scope

The appendix list only basic issue items required for the protection of Teletypewriter Sets AN/PGC-1 and AN/PGC-3 from damage.

B-2. General.

This Basic Issue Items and Items Troop Installed or Authorized List is dividied into the following sections:

a. Basic Issue Items List — Section II. A list, in alphabetical sequence, of items which are furnished with, and which must be turned in with the end item.

b. Items Troop Installed or Authorized List — Section III. Not Applicable.

B-3. Explanation of columns

The following provides an explanation of columns found in the tabular listings:

a. Illustration. This column is divided as follows:

(1) *Figure number.* Indicates the figure number of the illustration in which the item is shown.

(2) *Item number.* Not applicable.

b. National Stock Number. Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

c. Description. Indicates the Federal item name and a minimum description required to identify the item.

(1) *Part Number.* Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements, to identify an item or range of items.

(2) *Federal Supply Code of Manufacturer (FSCM).* The FSCM is a 5-digit numeric code used to identify the manufacturer, distributor, or Government agency, etc., and is identified in SB708-342.

d. Unit of Measure (U/M). Indicates the standard of basic quantity of the listed item as used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation, (e.g., ea, in., pr, etc). When the unit of measure differs from the unit of issue, the lowest unit of issue that will satisfy the required units of measure will be requisitioned.

e. Quantity Furnished with Equipment (Basic Issue Items Only). Indicates the quantity of the basic issue item furnished with the equipment.

SECTION II. BASIC ISSUE ITEMS LIST

(1) ILLUSTRATION (A) FIG. NO.	(1) ILLUSTRATION (B) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION PART NUMBER & FSCM	(3) DESCRIPTION USABLE ON CODE	(4) QTY FURN WITH EQUIP
1-4		5815-00-594-0000	CW-356/PGC-1	BAG ACCESSORIES [a]	1
2-1		5815-00-407-7394	CY-694A/PGC-1	CASE [a]	1
1-6		5815-00-869-3647	SM-B-42636	BAG ACCESSORIES [b]	1

[a] Part of AN/PGC-1, AN/PGC-3

[b] Part of TT-537/G

APPENDIX C

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

C-1. General

This appendix provides a summary of the maintenance operations for the AN/PGC-1 and AN/PGC-3. It authorizes categories of maintenance for specific maintenance functions on reparable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

C-2. Maintenance Function

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

b. Test. To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean, preserve, drain, paint, or to replenish fuel/lubricants/hydraulic fluids or compressed air supplies.

d. Adjust. Maintain within prescribed limits by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

e. Align. To adjust specified variable elements of an item to about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment used in precision measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install. The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment/system.

h. Replace. The act of substituting a serviceable like-type part, subassembly, model (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module/component/assembly, end item or system.

j. Overhaul. That periodic maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (e.g., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipment/components.

C-3. Column Entries

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies and modules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in clumn 2.

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a "worktime" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within

the listed maintenance function vary at different maintenance categories, appropriate "worktime" figures will be shown for each category. The number of man-hours specified by the "worktime" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time and quality assurance/quality control time in additional to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

C — Operator/Crew
O — Organizational
F — Direct Support
H — General Support
D — Depot

e. Column 5, Tools and Equipment. Column 5 specifies by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

C-4. Tool and Test Equipment Requirements (Table 1)

a. Tool or Test Equipment Reference Code. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. Maintenance Category. The code in this column indicate the maintenance category allocated the tool or test equipment.

c. Nomenclature. This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

d. National/NATO Stock Number. This column lists the National/NATO stock number of the specific tool or test equipment.

e. Tool Number. This column lists the manufacturer's part number of the tool followed by the Federal Supply Code for manufacturers (5-digit) in parentheses.

SECTION II MAINTENANCE ALLOCATION CHART
FOR

Teletypewriter Sets AN/PGC-1 and AN/PGC-3, and Teletypewriters TT-4A/TG, TT-4B/TG, TT-4C/TG, TT-335/TG, TT-537/G, TT-698/TG, TT-698A/TG, TT-698B/TG

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT
			C	O	F	H	D	
00	Teletypewriter Sets AN/PGC-1 and AN/PGC-3, and Teletypewriters TT-4( )/TG, TT-335/TG, TT-537/G, and TT-698( )/TG	Inspect	0.2[1]					
		Test	0.5[2]		0.6			1 thru 5
		Service	0.2[3]		0.7			1,2
		Adjust			2.5			1 thru 5
		Repair			0.2			1 thru 5
		Overhaul					24.0	1 thru 8
	NOTES 1. Used on TT-4A,B,C/TG and TT-698,A,B/TG only. 2. Used on TT-335/TG only. 3. Used on TT-537/G only.							
01	Immersion Proof Cover	Repair			0.2			2
02	Dust Cover	Repair			0.2			2
03	Governor (See Note 1 above)	Repair			0.4			1,3
03	Motor (See Notes 2 and 3 above)	Repair				0.5		1,2,3
0301	Motor (See Note 1 above)	Repair				0.5		1,2,3
04	Instrument Panel Assembly	Repair			0.6			2,3
05	Transmitter Contact Assembly	Repair			0.5			1,3,5
06	Platen Assembly	Repair			0.7			1
07	Automatic Carriage Return and Line Feed Mechanism (See Note 3 above)	Repair			0.6			1
08	Line Feed and Platen Shift Mechanism	Repair			0.5			1
09	Ribbon Mechanism Assembly	Repair			0.5			1
10	Margin Bell Assembly	Repair			0.4			1
11	Signal Bell Assembly	Repair			0.4			1
12	Type Bar Mechanism	Repair			0.6			1
13	Carriage Frame Assembly	Repair			0.5			1
14	Carriage Machanism	Repair			0.6			1
15	Paper through Assembly (See Note 3 above)	Repair			0.4			1
15	Paper Shaft, Paper Shaft Bracket and Paper Chute (See Notes 1 and 2 above)	Repair			0.4			1
16	Line Terminal Box and Signal Cable Assembly (See Note 3 above)	Repair			0.5			1,2,3
16	Line Terminal Box (See Notes 1 and 2 above)	Repair			0.4			1,2
17	Transmitter Camshaft, Filter and Locking Mechanism	Repair			0.5			1,3
18	Keyboard-Transmitter Sensing and Selector Lever Assembly	Repair			0.5			1,3,5

(1) Exterior
(2) Operational test.
(3) Clean (exterior), replace paper, ribbon, and spool

SECTION II MAINTENANCE ALLOCATION CHART
FOR

Teletypewriter Sets AN/PGC-1 and AN/PGC-3, and Teletypewriters TT-4A/TG, TT-4B/TG, TT-4C/TG, TT-335/TG, TT-537/G, TT-698/TG, TT-698A/TG, TT-698B/TG

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT
			C	O	F	H	D	
19	Key Levers and Code Bars	Repair			0.7			1
20	Print Bail Shaft Assembly	Repair			0.5			1
21	Selector Magnet Assembly	Repair			0.4			1,3,5
22	Motor Stop Assembly	Repair			0.6			1,3
23	Square Shaft Assembly	Repair			0.4			1
24	Carriage Return Shaft and Clutch Assembly	Repair			0.5			1
25	Code Ring Cage and Function Sensing Lever Group	Repair			0.6			1
26	Selector Lever Comb Assembly (See Note 3 above)	Repair			0.4			1
26	Selector-Lever-Comb Bracket Assembly (See Notes 1 and 2 above)	Repair			0.4			1
27	Selector Camshaft Assembly	Repair			0.5			1
28	Selector Levers and Y Levers	Repair			0.7			1
29	Function Selecting Machanism	Repiar			0.5			1
30	Carriage Feed Shaft Assembly	Repair			0.6			1
31	Carriage Rack Drive Shaft	Repair			0.5			1
32	Function Shaft Assembly	Repair			0.7			1
33	Main Shaft Assembly	Repair			0.4			1
34	Keyboard-Transmitter Drive Shaft	Repair			0.5			1
35	Transfer Lever Shaft Assembly	Repair			0.6			1
36	Junction Box Assembly (See Note 3 above)	Repair			0.7			1,2,3
36	Motor Filter Box Assembly (See Notes 1 & 2 above)	Repair			0.7			1,2,3
37	Frame Assembly (See Note 3 above)	Repair			0.4			1,2
37	Teletypewriter Frame Assembly	Repair			0.4			1,2
38	Base Assembly (See Note 3 above)	Repair			0.3			1,2
38	Teletypewriter Base Assembly	Repair			0.3			1,2

TABLE 1. TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
Teletypewriter Sets AN/PGC-1 and AN/PGC-3, and Teletypewirters TT-4A/TG, TT-4B/TG, TT-4C/TG, TT-335/TG, TT-537/G, TT-698/TG, TT-698A/TG, TT-698B/TG

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	F,D	TOOL KIT, TELETYPE EQUIPMENT MAINTENANCE TE-50B	5180-00-356-4602	
2	F,H,D	TOOL EQUIPMENT TE-111	5180-00-408-1877	
3	O,F,H,D	MULTIMETER TS-352B/U[a]	6625-00-553-0142	
4	F,H,D	OHMMETER ZM-21/U	6625-00-581-2466	
5	F,H,D	TEST SET, TELEGRAPH AN/GGM-15(V) (HIGH OR LOW LEVEL EQUIPMENTS)	6625-00-442-6131	
		NOTE IF TEST SET, TELEGRAPH AN/GGM-15(V) IS NOT AVAILABLE, THE FOLLOWING TEST SETS MAY BE USED (IF AVAILABLE) TO TEST THE AN/PGC-1, TT-4A/TG, TT-4B/TG, TT-4C/TC, TT-335/TG, AND TT-537/G (HIGH-LEVEL, 60-MA OR 30-MA EQUIPMENT).		
6	F,D	TEST SET, TELETYPEWRITER TS-2( )/TG (HIGH LEVEL EQUIP. ONLY)	6625-00-243-5173	
7	H,D	TEST SET, TELETYPEWRITER TS-383/GG (HIGH LEVEL EQUIP. ONLY)	6625-00-222-1714	
8	F,H,D	TEST SET, TELETYPEWRITER AN/UGM-1 (HIGH LEVEL EQUIP. ONLY)	6625-00-965-0195	
		CAUTION TEST SET, TELEGRAPH AN/GGM-15(V) MUST BE USED FOR TESTING THE AN/PGC-3, TT-698/TG, TT-698A/TG, AND TT-698B/TG (LOW-LEVEL, ±6-VOLT POLAR EQUIPMENT). USE OF THE ABOVE HIGH-LEVEL TEST SETS FOR LOW-LEVEL EQUIPMENT TESTING WILL CAUSE DAMAGE TO THE ELECTRONIC COMPONENTS OF THE EQUIPMENT UNDER TEST.		

[a]Authorized for performance of organizational maintenance only when using organization includes either a Teletypewriter Repairman (MOS 31J), or an Organizational Communications Repairman (MOS 31B).

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

SOMETHING WRONG WITH THIS MANUAL?

THEN. . .JOT DOWN THE DOPE ABOUT IT ON THIS FORM, TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)
Commander
Stateside Army Depot
ATTN: AMSTA-US
Stateside, N.J. 07703

DATE 10 July 1975

PUBLICATION NUMBER	DATE	TITLE
TM 11-5840-340-12	23 Jan 74	Radar Set AN/APC-76

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
2-25	2-28			Recommend that the installation antenna alignment procedure be changed throughout to specify a 2° IFF antenna lag rather than 1°. REASON: Experience has shown that with only a 1° lag, the antenna servo system is too sensitive to wind gusting in excess of 20 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to 2° without degradation of operation.
3-10	3-3		3-1	Item 5, Function column. Change "2 db" to "3db." REASON: The adjustment procedure for the TRANS POWER FAULT indicator calls for a 3 db (500 watts) adjustment to light the TRANS POWER FAULT indicator.
5-6	5-8			Add new step f.1 to read, "Replace cover plate removed in step e.1, above." REASON: To replace the cover plate.
		F03		Zone C 3. On J1-2, change "+24 VDC to "+5 VDC." REASON: This is the output line of the 5 VDC power supply. + 24 VDC is the input voltage.

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
SSG I. M. DeSpiritof 999-1776

SIGN HERE: SSG I. M. DeSpiritof

DA FORM 1 AUG 74 2028-2 (TEST)

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR MANUAL "FIND," MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

TEAR ALONG DOTTED LINE

Figure 1-2. DA Form 2028-2 (TEST)—sample.

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